The Veterinary Record.

(Founded by William Hunting, F.R.C.V.S., 1888.)

No. 20. MAY 18, 1929. Vol. 9.

Some Clinical Aspects of Tuberculosis in the Dog.

By A. R. Smythe, F.R.C.V.S., D.V.S.M., Falmouth.

(Late Professor of Materia Medica and Therapeutics, at the Royal Veterinary College, London).

Whereas Continental observers have contributed a great deal of information relative to the incidence and symptomatology of canine tuberculosis, the clinical data published in British veterinary literature is less extensive, and the information to be derived in connection with the so-called allergic reactions is very indefinite.

Various statistics as to the percentage of cases encountered in the larger European clinics are available, but no attempt appears to have been made to estimate the prevalence of the disease in the British Isles.

Diagnosis and the relative values of the various tuberculin tests are points of interest to the clinician and, from a public health standpoint, the possibility of the transmission of the disease to human beings, or the contraction of the disease from affected persons, from milk or meat, are items of some importance.

Over a period of two and a half years the cases presented for inspection at the out-patients' clinic of the Royal Veterinary College were recorded, various of the tuberculin tests applied and *post-mortem* examinations conducted. In a number of instances the desired infective material was handed to the Research Institute in Animal Pathology, in order that the causal bacillus might be typed.

During the period mentioned the percentage of cases recorded has been much lower than those published by the various French schools, and a percentage ranging between 0·3 and 0·4 of the total number of dogs clinically examined would seem to be a true estimate of the cases occurring during the time under review.

General Symptoms.—In making observations on a number of dogs affected with tuberculosis, one can differentiate, to some extent, the individual cases into certain groups as, for instance, pulmonary, abdominal, visceral, arthritic, pharyngeal, generalised; but whilst, in some of the cases, the *post-mortem* examination will show that the lesions were confined to one organ or group of organs, in the majority evidence will be found that the disease is a steadily progressive one, and that infection has spread from one of the great cavities to the other, or to more distant parts of the body.

In addition to the varying symptoms arising as a result of the invasion of certain specific organs, certain other general symptoms also become evident, one at least of which is of diagnostic value

In giving the history, the owner usually states that the animal seems unwell and is losing flesh. It may appear to be listless and to lack energy, and also to take an abnormal amount of rest and to become quickly exhausted after exertion. Anorexia sometimes occurs, or the animal may be capricious or voracious in its desire for food.

In pulmonary tuberculosis a cough is often, but not always, present. The character and intensity vary widely in different cases; the nature of the respiration is significant in some instances.

Vomition is sometimes met with and in advanced alimentary involvement, a profuse blood-stained diarrhœa is evident.

Localised lesions also occur, and may take the form of discharging sinuses in the neighbourhood of lymphatic glands, yielding a purulent, creamy, whitish or blood-stained discharge; similar lesions are also observed as a result of secondary infections.

Lameness, accompanied by marked enlargement, and a varying degree of tenderness of certain of the joints of the limb, is also a symptom.

The temperature is of less value in diagnosis; in advanced cases it may be subnormal; in pulmonary involvement it often ranges between 103·4° and 104° F., whereas generally it is intermittent or remittent in character, and liable to marked fluctuations from hour to hour and day to day. Were hourly readings easily obtainable over prolonged periods, valuable evidence might be afforded, more especially in pulmonary infection. The state of general nutrition varies in affected dogs; whereas in many advanced cases the body is markedly emaciated and the dorsal spines and ribs show prominently through the skin, in other instances this is not apparent, but in virtually every case, and even in the early stages of the disease, the facies is characteristic, and is the general symptom referred to as being of diagnostic value.

The subcutaneous fat covering the temporal and orbital areas disappears early in the disease and the muscles of this region appear to undergo some degree of atrophy. This causes the sagittal crest and zygomatic ridge to appear unduly prominent, and moreover, the eyes exhibit a somewhat characteristic expression of anguish. This wasting of the tissues of the temporal area is also met with in other diseases, as in certain forms of distemper affecting more especially young dogs, in some constitutional diseases, and in senile decay, but the expression of the eyes seems to be only reproduced in the cachexia associated with malignant new growths, more common in, but not confined to, advancing years.

Pharyngeal Tuberculosis.—Tuberculosis affecting the pharyngeal region is occasionally met with; the nature of the lesion encountered has been a progressive involvement of the various lymphatic glands in a tuberculous process. A dissection of the part will show the presence of tubercles in some of the glands and, in others, a process of softening and breaking down, leading to the formation of what may be termed cyst-like masses. These masses are often far larger than the glands which they have replaced, and are composed of a fine membranous covering holding a whitish, coagulated matrix, and a quantity of turbid, flocculated, milky fluid. In other places, the glands may be replaced

by a yellowish, purulent material. Sinus formation eventually connects these areas with the adjacent skin, and a purulent and perhaps blood-stained discharge exudes, in which the bacillus of tuberculosis can sometimes be demonstrated.

All discharging sinuses in this region must not be regarded as tuberculous; several cases have been encountered where a sinus, discharging a blood-stained, glairy fluid, has been proved by *post-mortem* and by histological methods to be connected with malignancy of the thyroid.

Thoracic Tuberculosis.—The organs contained within the thorax may be the primary and only site of tuberculous changes, or such alterations may be secondary lesions elsewhere. We have several times queried the owner's statement that no cough was existent, when extensive thoracic involvement was obvious, but in some dogs kept under strict observation no cough has been heard although, on subsequent *post-mortem*, pulmonary and cardiac lesions have been advanced. In the majority of cases, cough is manifest and presents a wide diversity in its character; it may be short and husky, or more intense, occurring in paroxysms, and leading to attempts at vomition, accompanied by the ejection of a little white, frothy material; in other cases, where the lymphatics have been involved, causing pressure on the trachea, and also when pericarditis has been present, a paroxysmal cough, followed by a prolonged crowing sound and an exaggerated retching noise has been only too evident.

The respiratory movements will be seen to vary from the normal in certain forms of the disease, and more especially after exertion. Changes from the normal may be observed in pleurisy, pericarditis, when the diaphragm is implicated with marked thickening from tuberculous deposits, when the lungs are extensively involved and more especially when fluid has been thrown out into the pleural and pericardial sacs.

Painful areas lead to a voluntary fixation of the chest wall, overlying the part involved, during respiratory movement; a failure to function of a portion of the lung tissue, arising out of tuberculous changes, adhesions, the pressure of fluid or enlarged glands, stimulates hyperfunction of the more healthy portions in order to keep the blood oxygenated, and abdominal respiration may become exaggerated and the thoracic depressed.

Of significance in diagnosis is a peculiarity in respiration associated with the above pathological changes, leading to a lack of co-ordination of the thoracic and abdominal muscles during inspiration and expiration. Palpation in the intercostal spaces may give rise to pain, both in pleurisy and pericarditis, and pressure in the epigastric region, when directed against the diaphragm, may elicit a painful groan. Where hydrothorax exists, the chest wall may show bulging and be asymmetrical as compared with the opposite side. In advanced cases where fluid exists in the thorax or pericardial sac, the additional pressure exerted may induce a syncopal attack.

Percussion sometimes affords an indication of the changes within the chest; one may endeavour to detect the dulness of consolidated areas and of enlarged glands, the limits of the fluid content, or the hyper-resonance present in cavitation of the lung, but the aid afforded in diagnosis, especially in long-haired dogs, is inferior to that obtained by the use of the stethoscope.

The multiplicity of the lesions encountered in tuberculosis affecting the thorax naturally results in a great variation of the sounds yielded by auscultation. They may, to some extent, be grouped into those arising from changes connected with:—(1) The lung substance; (2) the pleura; (3) the glands of the thorax; (4) the pericardial sac and myocardium; and (5) the outpouring of fluid. One should bear in mind the nature of the onset of the disease. This consists in the introduction of the causal bacillus into the lung substance, followed by the reactionary phenomena of congestion, consolidation, softening and cavitation, or alternatively, fibrosis may occur. Rhonchi, also râles, fine and sibilant, may be detected. An aid to diagnosis is to make the animal cough, when sounds, not otherwise audible, can be heard.

In consolidation, areas of dulness occur, but since consolidated lung is a better conductor of sound than normal lung, tubular breathing may often be evident; breaking down of lung tissue will cause moist, clicking râles, exaggerated tubular breathing, and if the animal be made to cough, a post-tussic suction may sometimes be detected when cavities are present.

Pleurisy may be revealed by the usual pleuritic friction; it may be unilateral or bilateral. With the pressure of the fluid, sound is absent below the fluid level, and negation of sound sometimes affords valuable evidence. In extreme cases, sound may be entirely absent. The body may be swayed in the endeavonr to elicit the splash of fluid in motion. Adhesions result in the obliteration or modification of sound according to the condition of the underlying lung.

Involvement of glands is less easily diagnosed. Usually there is a large area of dulness and the character of the cough is sometimes of value.

In pericarditis, the friction sounds may be heard, and these do not synchronise with the respiratory movements. Pain may be evinced from pressure of the stethoscope. With effusion, the friction sounds become modified, or obliterated, and a large area of dulness may exist, or the heart sounds may be masked and difficult to detect on account of the inflammatory deposit and new tissue formation.

Abdominal Tuberculosis.

In fairly advanced cases, on inspection, the vertebræ and ribs are seen to stand out prominently through the skin. The ribs overlying the region of the liver may appear to be unduly prominent. This is a result of enlargement of the liver, a condition which has been found to be frequent in abdominal tuberculosis of the dog.

If any great amount of fluid has been thrown out into the peritoneal cavity, the abdomen will be pendulous; the presence of fluid can be determined by palpation. Although a small increase in the quantity of fluid normally present is common, a marked excess does not seem to be the rule.

Adventitious growths often can be felt on the surface and in the substance of the liver and rather convey an impression of multiple tumour formation.

The omentum is occasionally very thickened and nodular and can be felt as an abnormality.

The mesentery is sometimes thickened; more often it contains multiple shot-like bodies in its substance. Occasionally tuberculomata occur in other sites.

Post-Mortem Appearances of the Thoracic Cavity.

On laying open the cavity of the chest, one frequently encounters fluid; this is commonly present in small amounts when tuberculosis exists, but frequently considerable quantities occur in this situation. In many cases, it is confined to one side of the thorax, and occasionally it entirely fills the cavity formerly occupied by the expanded lung, and so brings about a condition of atelectasis, the remains of the lung appearing vestigial, and of a deep reddish-brown colour.

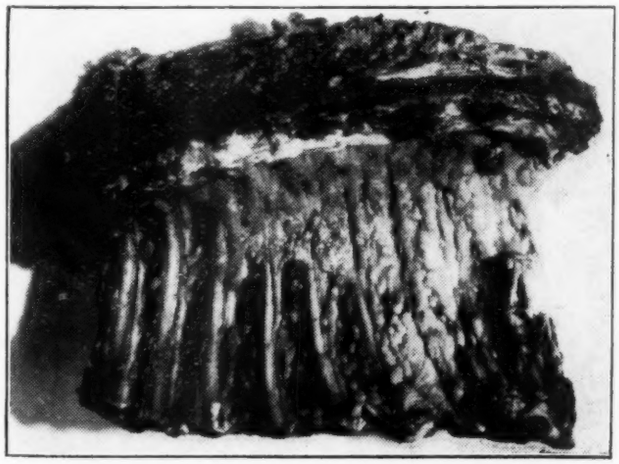
In other cases, both sides of the chest contain a variable quantity of fluid. This fluid is usually watery and turbid, containing floccules of coagulated fibrin, or it may be serous, blood-tinged, or greenish in colour.

A fibrinous deposit may cover the serous surfaces which have been bathed by the fluid, or the lung may be adherent to adjacent structures. In one instance, the edges of the right lung were firmly fixed to the chest wall, and on being torn away, there escaped from a cavity between the upper portion of the lung and the side of the thorax a considerable quantity of turbid, serous fluid.

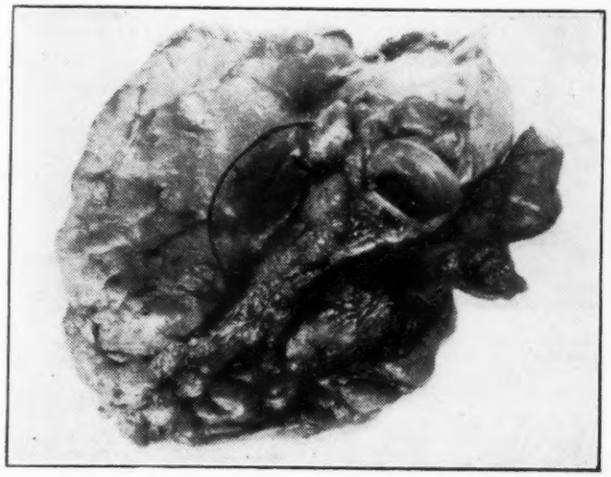
Often, on laying open the thorax, greyish, grape-like masses occlude any further view of the chest cavity.

On removing the organs from the thorax, the serous surfaces lining that cavity may show small gelatinous-like excrescences, rounded and varying in size from a mere speck upwards.

The parietal pleura may show papillomatous-like outgrowths, but more often greyish, flattened elevations, somewhat chalklike in nature, irregular in outline and with broad bases are seen; when discrete, these areas tend to be ovoid, but in advanced cases they become united with adjacent growths to form a thick covering as illustrated in photograph.



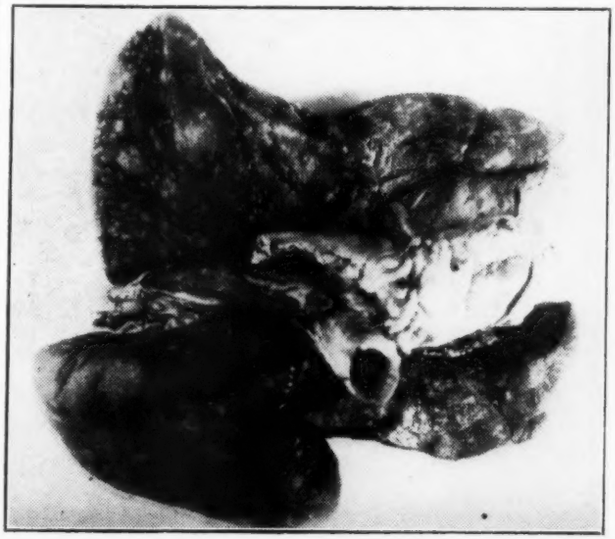
This photograph illustrates the character of the lesions met with in advanced tuberculosis affecting the costal pleura.



The pulmonary aspect of the diaphragm, showing extensive, tuberculous, chalk-like deposits. The remains of the right lung may be seen; the left lung is slightly distorted from fixative.

The serous covering of the diaphragm may be similarly affected, but the deposit may here form a thick, dense covering, completely immobilising that structure.

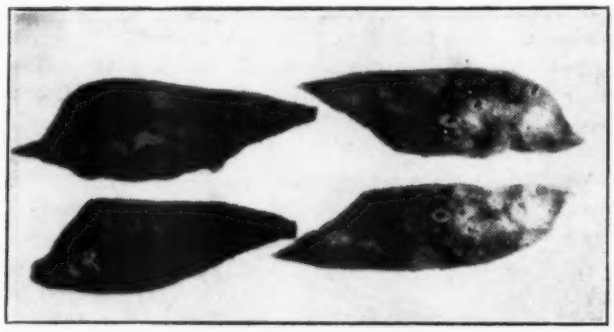
In the photograph shown, this condition is illustrated, and attention is also directed to the advanced atelectasis of the right lung, resulting from the pressure caused by pleuritic exudation.



Showing the lungs studded with tubercle formation.

In early cases, small hæmorrhagic points may be observed on the surface of the lung, or minute tubercles may be seen surrounded by a congested area. In many cases, the lung substance will be seen to be studded with tubercle formation. These may be few in number, and confined to one portion of the lung, or very numerous and scattered irregularly throughout the substance of both lungs. They may be very minute and rounded, or large and irregular in outline, and they appear as greyish, translucent, or pinkish-grey masses, surrounded by a dark purplish zone.

XUM



Sections of the lungs shown in preceding photograph. The consolidated areas are well marked.

On section they show up as greyish, solidified areas and, in some, softening and breaking down of the central portion can be observed. Later, the degeneration becomes more pronounced and cavitation of the lung tissue follows; multiple irregular cavities may be observed in the same lung. They may be quite minute or up to the size of a hen's egg; their walls are ragged, and irregular, and they contain a frothy, blood-stained fluid.

FIG. A.

Illustrating the character of the changes involving the epicardium and myocardium. (*a*) moderately advanced; (*b*) very advanced; and (*c*) as in (*a*) showing thickening and chalky deposits involving the pericardial sac, which has been reflected.

In other places, one finds scars, composed of shrunken, fibrous tissue, which appear to represent the sites where cavitation and subsequent repair have been carried out.

Occasionally, consolidated areas undergo a fibrous thickening and are encapsuled in masses of dense fibrous tissue. The mediastinum may be coated with a fibrinous deposit, or it may be very much indurated; tubercles are met with scattered throughout its substance, or greyish papillary masses of tuberculous tissue may hang pendant from its surface. The same holds true in the case of the pericardial sac.

This is often firmly attached to the serous coating of the heart throughout its entire surface; sometimes only the upper portions are attached, whilst the lower part of the sac contains a variable quantity of fluid. The surface of the heart may be hidden in a sero-fibrinous deposit.

Papillomatous-like outgrowths may be present on the surface of the heart, or the pericardial membrane. These are sometimes few in number, and discrete, or they may be sufficient completely to clothe the heart to a considerable depth.

In one case, tuberculous pericarditis was encountered without lesions being discoverable elsewhere in the body.

The various glands of the thorax may be involved; the bronchial, mediastinal and suprasternal are more commonly the site of tuberculous changes, and they may appear enlarged, œdematous, indurated and contain multiple, small tubercles. Many of them tend to enlarge and undergo softening. They are then more often whitish in appearance, and show up as a thin membrane containing and

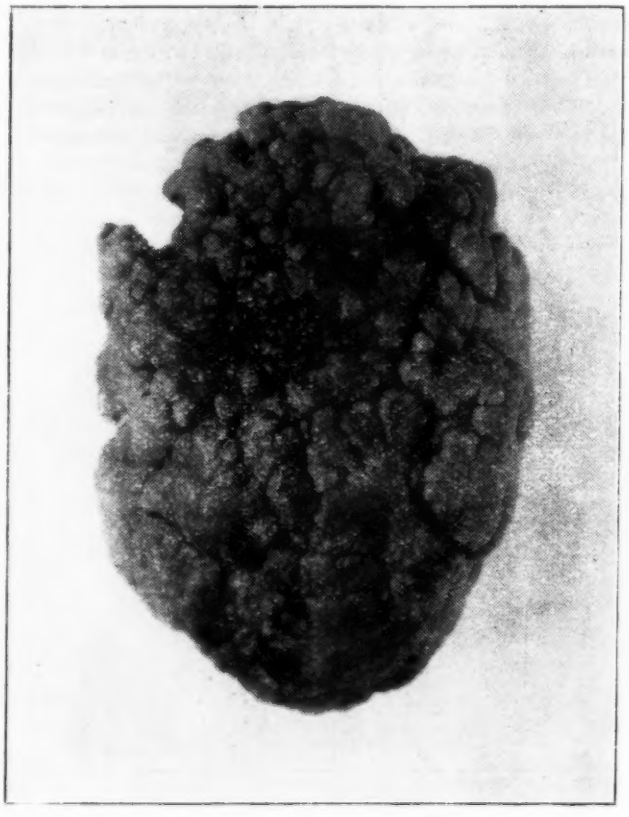


FIG. B.

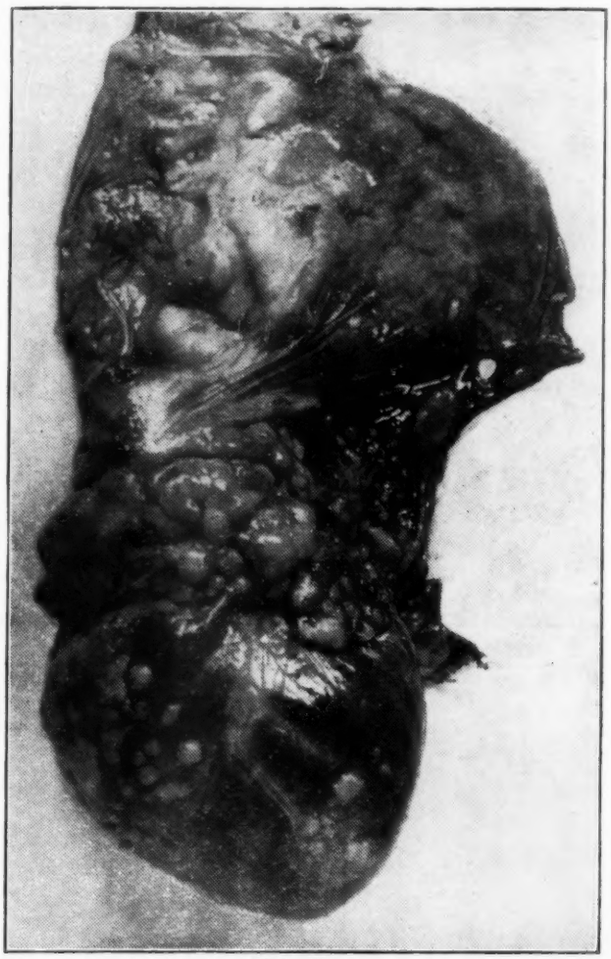


FIG. C.

enclosing a whitish, coagulated material, which holds in its cavities a watery, turbid fluid and flocculi.

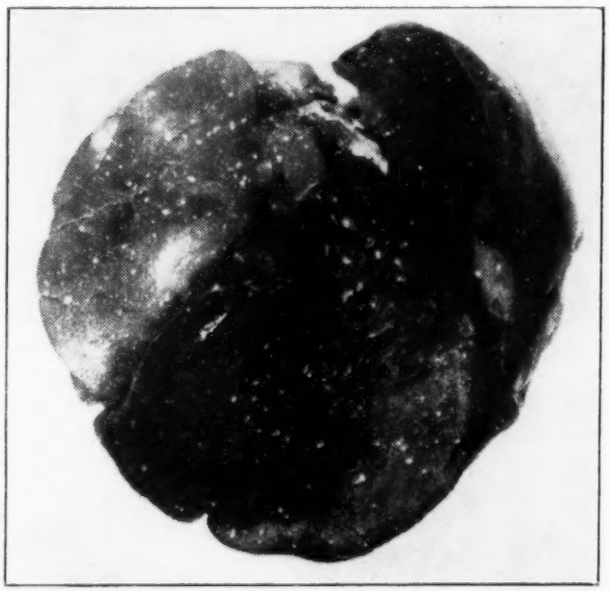
The bronchial and mediastinal glands may become enlarged and fused, causing pressure upon and displacement of, adjacent structures.

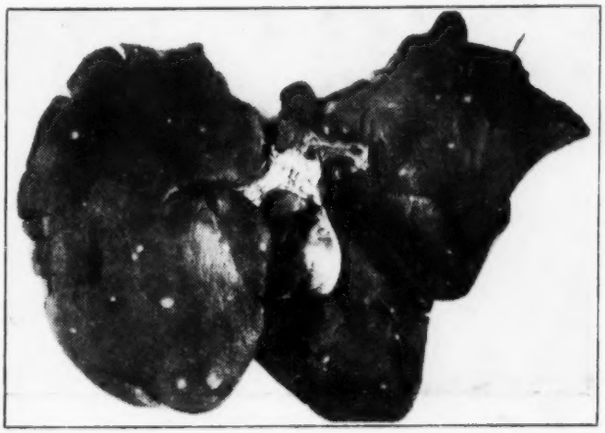
POST-MORTEM APPEARANCES OF THE ABDOMINAL CAVITY.

On laying open the abdominal cavity, a small amount of watery, turbid fluid is usually encountered. Large quantities of fluid are not common, but may occur in this situation. The cases of ascites met with in dogs have, in most instances, been due to other causes.

The peritoneum has not been found to be a common seat of tuberculous lesions. It may, however, show extensive areas covered with a greyish or fibrinous coating; or tuberculous vegetations may be present.

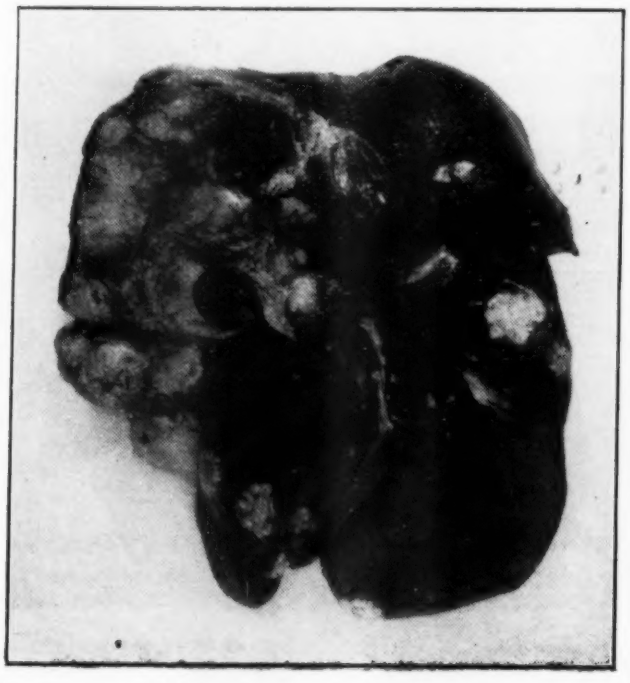
LIVER.—The liver has been found to be affected in nearly every case and, in thoracic tuberculosis, it has several times been the only abdominal organ affected. It is usually enlarged and the surface will show the presence of tuberculous lesions. These may be small, rounded in outline, very numerous, and peppered fairly evenly over both surfaces.

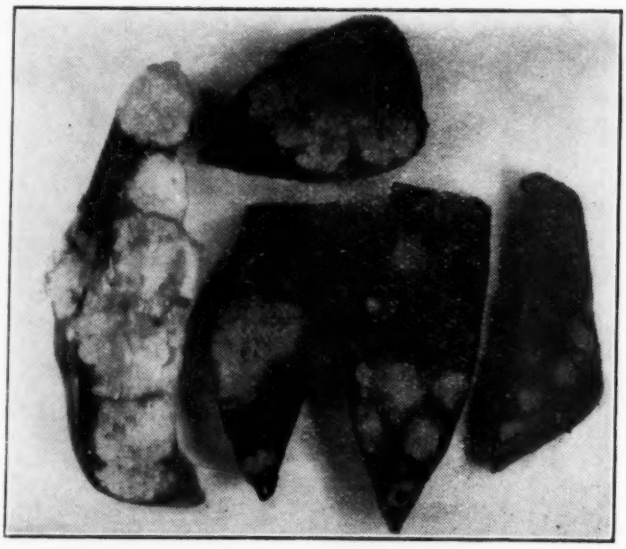




Adjacent tubercles may increase in size and become fused together, with the consequence that extensive areas of liver tissue become altered into a mass of tuberculous material showing none of the characters of normal liver tissue.

In other instances, the areas involved stand out sharply from the surface of the liver as islets, often approximating in size to a golf ball; the centres of such areas are often cupped and shrunken.





Sections of liver showing different stages. Softening is well marked in largest lesion.

The walls of the gall bladder may show the presence of tubercles, as may the portal glands; the latter may be enlarged and undergo softening.

In early cases, on section of the liver, the tubercles are seen to be discrete, later they invade the liver in an irregular manner, so that ultimately only small areas of unaltered liver substance remain.

Softening may occur, and, in some instances, contraction of the cavity thus formed takes place, leading to a crater-like appearance of the surface of the tuberculoma.

KIDNEYS.—The kidneys are frequently affected and one may observe, before removing the capsule, that some abnormality exists. After stripping off this, rounded or oval islets, sharply differentiated from the surrounding cortex, are seen. The capsule is often adherent in places to the undifferentiated cortex and, in cases where no tuberculous changes are macroscopically visible, it is the rule to find evidence of a chronic interstitial nephritis.

The tuberculous areas on the cortex are greyish and translucent, or yellowish in colour, smooth, sharply defined and slightly raised above the level of the surrounding cortex. Several such areas may be encountered in a single kidney and, in size, they may be quite minute or large enough to involve a considerable portion of the surface of the kidney.

On section, they are seen to penetrate the cortical substance and, in some cases, to have invaded the medulla.

Scattered foci which have undergone caseation may be present in the cortical substance, the medulla or pelvis.

Both kidneys are usually affected, but in a different degree.

The spleen has only been observed to be affected in a small number of animals. In these it has appeared to be somewhat enlarged; small whitish tubercles ½ to 1 mm. in diameter have been observed on its surface, and also some irregular larger lesions, yellowish in colour and about 3 mm. in diameter.

The omentum is frequently involved. It may be covered with a fibrinous deposit or contain innumerable small tubercles scattered irregularly throughout its meshes, and similar lesions are extremely common in the mesentery. In other cases, the omentum is very much indurated, leathery and whitish in colour; caseating centres may be present.

Showing (*a*) advanced involvement of the omentum, which is very much thickened; (*b*) multiple small tubercles in mesentery; (*c*) enlargement and commencing softening of ileo-cæcal glands.

When so altered, it can be detected during life by palpation. The various glands, more especially those of the ileo-cæcal region, show the typical glandular changes, as met with in the thoracic cavity.

The intestines are frequently thickened and ulcers with indurated edges have very occasionally been met with in their lumen.

The pancreas has been observed to be the site of numerous small tubercles, undergoing caseation on several occasions.

BONES.—In a few dogs the bony structures have been involved. The changes have been especially noticeable in the bones of the limbs.

In the neighbourhood more especially of the joints, but also in the regions of the long bones, marked enlargements have been observed. These are doughy to the touch, and

Showing one vertebra, the sacrum, pelvis and affected bones of two hind limbs taken from the same case as the preceding photograph.

painful on pressure, and during life the animal may show a degree of lameness in locomotion.

On *post-mortem*, the vertebræ, pelvis and ribs have also been found to be involved.

The nature of the changes is illustrated by photographs.

Showing the bones of the fore-limb; this case is described under Case 6. The condition is one of chronic osteitis and periostitis.

Some Observations on the Use of Tuberculin as an Aid to Diagnosis in Canine Tuberculosis

A number of cases of tuberculosis, which have been encountered in dogs, together with the observations made after the application of various of the tuberculin tests, are recorded.

These cases represent only a portion of the animals, so affected, which have been tested, but they suffice to illustrate the type of reaction which has been observed.

With one exception, all the cases enumerated have been subjected to *post-mortem* examination; in all cases the diagnosis has been verified by bacteriological methods and, in the majority of cases, the diagnosis has been verified by cultural and biological methods.

The forms of the test employed have been the ophthalmic, the endermic, the intradermic and the subcutaneous.

The first three methods were resorted to, more especially, in the early cases met with; recently, the subcutaneous test has been used singly, since it has been found to be the only one of the four tests enumerated to yield helpful information.

The Ophthalmic Test.—From one to three minims of concentrated tuberculin have been dropped on to the cornea of the left eye, the lids have been lifted across the cornea, and gently massaged in order to ensure the distribution of the tuberculin.

The eye has been inspected at varying intervals up to the 96th hour. In a number of dogs, the initial application has been regarded in the light of a sensitising dose, and the so-called diagnostic dose has been applied in a manner similar to that employed for the initial dose.

In different animals, the intervals which have elapsed between the application of the first and second doses have been 24, 48 and 72 hours. In these cases, the right eye has been regarded as a control. In a few cases, some congestion of the conjunctiva has been observed a few hours after the instillation of the tuberculin. In fourteen tuberculous dogs so tested no reaction has been observed which might be regarded as positive or of value as an aid to diagnosis.

The Endermic Test.—The skin has been lightly scarified, and concentrated tuberculin gently rubbed into the scarified areas; in other cases, a drop of tuberculin has been placed on the skin, and the part gently pierced in several places with a fine hypodermic needle. Other areas have been subjected to a similar treatment, but the tuberculin has been withheld; the purpose has been to have a control to serve as a guide in the event of a reaction.

The application of the tuberculin has been repeated after 24, 48 and 72 hours in different cases.

The sites chosen have been the hairless parts of the body—either the inner surface of the ear flap or the region of the groin. In nine cases so treated, and afterwards proved to be affected with tuberculosis, no reaction of any diagnostic importance was observed.

The Intradermic Test.—This test has been carried out in a manner similar to that employed for the endermic test, excepting that the dose has consisted of two minims of concentrated tuberculin, injected into the layers of the skin in such a way as to cause a bead-like elevation of the superficial layers.

In no case have heat, pain and swelling been observed after either the sensitising or diagnostic dose.

A transient œdema has been seen several times, as a direct result of the injection. In one instance, a dog with advanced tuberculosis, a slight localised induration formed at the seat of injection. This was free from heat and pain, and was sharply circumscribed and covered an area the size of a threepenny piece.

At the point of entrance of the needle, a hæmorrhagic infiltration of the tissues occurred over an area having a diameter of 3 m.m. This was followed by scab formation and healing.

Similar results have not been observed, nor has a reaction of diagnostic value been observed, in seven other animals affected with tuberculosis.

The Subcutaneous Test.—A difficulty often arises in that the temperature of the dog is so elevated that any thermometric test is rendered impossible.

This febrile phase has been encountered more especially when clinical symptoms of thoracic involvement have been present. It has been found that, in nearly every case, the temperature will subside if the animal is kept quiet and at rest over a period of a few days.

In order to calculate the initial average temperature one should obtain the temperature readings over a period of two, and, if possible, three days, and as the reaction appears to occur fairly constantly between the fourth and tenth hours, it is suggested that the most favourable periods are at 8 a.m., and around 2 p.m. and 6 p.m. The pre-injection temperature chart then serves for purposes of comparison with the post-injection chart. It has been found that the most suitable hour for the administration of the tuberculin is around 8 a.m., and one can then obtain the temperature every two hours throughout the day.

It is possible that fewer temperature readings would suffice, but, owing to the rapidity of the rise and fall in certain cases, it does not seem desirable to reduce the number between the fourth and tenth hours if one wishes to obtain the highest readings.

It is not easy to lay down any definite temperature limits as being diagnostic of tuberculosis after the application of the subcutaneous test, and records of a great many tests would be required in attempting to follow such a procedure.

During the few hours following the injection of the tuberculin, a fall in the temperature may be noted, but it seems that a sustained rise, either mounting to a peak or a plateau, and followed by a steady fall, usually to a level below that of the initial temperature, is indicative of tuberculosis, especially when associated with clinical symptoms. Precise figures of actual temperatures registered will be seen below, but it is interesting to note the average temperatures of a number of cases grouped together. They read as follows:—

Average pre-injection temperature, 101·7°.

Dose of tuberculin, administered subcutaneously at 8 a.m., 1 c.c.

Average temperatures at hours of—

8 a.m.	10 a.m.	12 noon	2 p.m.
101·9	102·0	103·0	103·5
4 p.m.	6 p.m.	8 p.m.	10 p.m.
103·5	102·8	102·25	102·0

A number of dogs a few hours after the injection of the tuberculin appear extremely ill, dejected, and decline to move. Although this result has not been observed in every case tested, these symptoms appear to be fairly constant, aud to afford evidence of value in reactions which are of a doubtful nature.

Dogs in an advanced stage of the disease, and very emaciated, may fail to give a thermal reaction, but their dejection may become more profound. The dose of tuberculin employed has been either 1 c.c., or else 20 minims. The former appears to be a suitable dose. In a few cases, this dose has been repeated on the day following the subcutaneous test and the temperature recorded. There does not appear to be any advantage in repeating the subcutaneous test, but the figures recorded are quoted in two instances; after the second dose the animal becomes extremely ill or verges on collapse.

Diagnosis of Canine Tuberculosis.

It has already been stated that the facies of tuberculosis is a clinical indication, which appears to be constant, in this disease in the dog.

Although a similarity of physiognomy may be partially or entirely reproduced in certain other conditions, the appearance presented on inspection may be regarded as a leading symptom in diagnosis, and helps to narrow down the pathological conditions from which the patient may be suffering.

A further clinical examination will often reveal abnormalities in one or both of the great serous cavities, or in other portions of the body; those which have been met with have been described. In a proportion of cases, it is possible to obtain infected material such as the discharge from a sinus, urine, pleuritic or ascitic fluid, and by appropriate bacteriological methods to identify acid-fast bacilli; such methods can only be regarded as of value when a positive diagnosis is arrived at.

The tubercle bacilli numerically show wide divergences in different lesions in the same dog, and whereas one may fail to detect their presence in the one lesion, elsewhere they may be shown to exist in large numbers.

In certain instances, the family history of the owner of the affected animal is of interest; an endeavour has been made to collect information in twenty cases of tuberculosis affecting the dog; of these, four dogs lived in direct contact with people suffering from pulmonary tuberculosis; four dogs lived in direct contact with people who were chronic invalids, but the cause of the illness could not be ascertained; one dog was the property of the keeper of a restaurant; eleven dogs were in private ownership, and existence of tuberculosis in the family was denied.

Of the several tuberculin tests, the subcutaneous method alone affords information of value. This is more easily appreciated on perusing the cases which have been recorded. In one instance, an irregular reaction has to be stated in a dog in which it was not possible to detect macroscopically lesions of tuberculosis on *post-mortem* examination.

Record of a Case of Tuberculosis in which the Ophthalmic, Endermic, and Intradermic Tests were Applied.

Subject.—Crossbred Corgi terrier, four years old.

Symptoms.—Dog losing flesh; anorexia; very repulsive cough, paroxysmal in nature, starting as a prolonged croup and ending as a noisy retching. Facies well marked. Temperature 103·4°.

Tuberculin Tests.—

Ophthalmic, Endermic, Intradermic } Tests applied and repeated after 48 hours. All negative, no reaction.

Animal remained under treatment for two months; supervening symptoms were chiefly thoracic in nature—the cough became more pronounced, a marked peculiarity in the respiratory movements became very obvious.

Cavities could be detected in the lungs, pericarditis and hydrothorax were thought to exist. The ophthalmic, endermic and intradermic tests were repeated after an interval of two months. The interval between the sensitising and diagnostic dose was 48 hours. No reactions

were observed as a result of these tests. The owner was persuaded to have the animal destroyed.

Post-mortem.—Numerous tubercles and areas of consolidation scattered throughout both lungs; five cavities right lung, largest approximating to a hen's egg in size, ragged and irregular, and filled with a frothy, blood-stained fluid. Bronchial and mediastinal glands enlarged. Well-marked pericarditis, pericardium adherent to heart in its upper third, fluid of a sero-fibrinous nature distending lower two-thirds of sac; inner surface of sac coated with a brownish-green fibrinous deposit. Liver and kidneys extensively affected. Tubercle bacilli present in lesions on kidney cortex and in pericardial sac. Type, bovine in origin.

Description of a Number of Cases of Canine Tuberculosis.

A brief Clinical History, the reactions resulting from the various Tuberculin Tests employed and the post-mortem findings are recorded.

Case No. 1.

Subject.—Bulldog, male, three to four years old.

Owner.—Private person, no history available *re* presence of tuberculosis in family.

Symptoms.—Animal had been ill for some weeks. Facies well marked, emaciation advanced, and debility very pronounced. Anorexia complete, fæces diarrhœic, offensive and melænic. Mucous membranes anæmic and pallor profound. Temperature limits whilst under observation, 99° to 99·6° F. Pain present on palpation, especially in epigastric region. Well marked râles present in lungs, heartbeat muffled, presence of fluid suspected in pericardial sac. Palpation of abdominal region revealed well-marked growths in liver substance.

Tuberculin Test.—Ophthalmic test applied, 2 minims of concentrated tuberculin being instilled into left eye; result negative. Subcutaneous test was employed 24 hours after the application of ophthalmic test. Dose tuberculin—1 c.c. at 8 a.m. Average initial temperature—99·3° F. Temperature readings at intervals of 2 hours—

8 a.m.	10 a.m.	12 noon	2 p.m.
99·1	99·3	99·6	100.1
4 p.m.	6 p.m.	8 p.m.	
100·0	99·7	99·6	

Subsequent to the test, the animal collapsed and was destroyed. It must be emphasised that emaciation and weakness were well-marked symptoms before the application of the test.

Post-mortem.—Lungs presented a number of consolidated areas; bronchial glands enlarged and contained tubercles. Pericarditis advanced, the serous coating of the heart and the inner surface of the pericardial sac were adherent in their upper thirds, being bound together by fibrinous tissue, a small quantity of fluid was present in the lower portion of the pericardial sac. Liver was very enlarged and contained numerous islets of tuberculous tissue, yellowish-white in colour and varying in size from a mere speck up to that of a half-crown piece; the larger areas showed depressions in their centres. The kidneys, after removal of capsule, showed a number of discrete, greyish-white islets of tuberculous tissue, slightly raised above the surrounding cortex, the largest approximating to a penny piece in size. Tubercle bacilli could not be demonstrated in smears from pericardial sac. They were numerous in the kidney areas. Type, bovine in origin.

Case No. 2.

Subject.—Wire-haired fox terrier dog, three years old.

Owner.—Retired, in poor health; states he is free from tuberculosis.

Symptoms.—When first submitted for treatment, the symptoms resembled those of catarrhal distemper with conjunctivitis, nasal discharge, broncho-pneumonia. Improvement occurred under treatment, but recovery was not complete; later, the dog was re-submitted for treatment and the following symptoms were noted. Facies of tuberculosis, dyspnœa and disinclination for exercise, marked cough on exertion, anorexia. General condition fairly good. Subcutaneous tuberculin test applied three months after onset of preliminary illness.

Tuberculin Test.—Average initial temperature—101·8°. Dose tuberculin—1 c.c. injected at 8 a.m. Temperature readings at intervals of 2 hours—

8 a.m.	10 a.m.	12 noon	2 p.m.
101·7	102·5	103·7	104·8
4 p.m.	6 p.m.	8 p.m.	10 p.m.
105·3	105·9	104·4	103·0

8 a.m. next morning.
101·5

The owner declined to have the dog destroyed after the test, so that the diagnosis could not be verified by *post-mortem* examination. This case is recorded owing to the temperatures registered being the highest met with in dogs after the application of the subcutaneous test.

Case No. 3.

Subject.—Sealyham cross-bred terrier dog, three years old.

Owner.—Private person, no family history.

Symptoms.—Facies characteristic, bodily condition fair, no emaciation. Temperature 102·0°. Cough, lung abnormalities and broncho-pneumonia present. Brain symptoms also evident, partial stupor and periods of mental aberration.

Tuberculin Test.—The ophthalmic, intradermic and epidermic tests were employed simultaneously and repeated after 48 hours; no reactions were apparent as a result of these tests. The subcutaneous test was then applied. Average initial temperature—101·9°. At the time when the tuberculin was administered (1 c.c. at 8 a.m.) the temperature had risen to 102·7°. Temperatures recorded during the subcutaneous test—

8 a.m.	10 a.m.	12 noon	2 p.m.
102·7	101·2	102·9	103·8
4 p.m.	6 p.m.	8 p.m.	
103·6	103·2	102·4	

Post mortem.—Well marked chalky deposit present on parietal pleura on both sides of chest, more especially on the left side; bronchial and suprasternal glands enlarged and indurated, numerous centres present in both lungs, thoracic surface of diaphragm presented isolated gelatinous deposits. Liver was dotted on all its surfaces with small,

discrete, yellowish, tuberculous areas. Mesentery and omentum presented a number of small calcified areas. Brain congested and showed minute areas of hæmorrhagic infiltration. Tubercle bacilli were not demonstrated in brain areas involved.

CASE No. 4.

Subject.—Male Fox terrier dog, three years old.

Owner.—Private person.

Symptoms.—Facies characteristic, emaciation marked, no other symptoms of value.

Tuberculin Test.—Subcutaneous employed. Dose—1 c.c. at 7 a.m. Average initial temperature—100·8° Temperatures recorded after injection of tuberculin.

7 a.m.	8 a.m.	9 a.m.	10 a.m.
101·0	101·5	101·3	100·6
11 a.m.	12 noon	1 p.m.	2 p.m.
101·3	102·8	103·8	104·0
3 p.m.	4 p.m.	5 p.m.	6 p.m.
104·0	104·2	104·1	103·2
7 p.m.	8 p.m.	9 p.m.	10 p.m.
103·2	103·0	102·6	102·3

8 a.m. following morning.
100·7

Post-mortem.—Well marked, small, discrete areas in liver and kidneys. Type of bacillus, of bovine origin.

CASE No. 5.

Subject.—Spaniel dog, one year old.

Owner.—Private person.

Symptoms.—Facies well marked. Short, husky cough—broncho-pneumonia. Temperature, 104·5°. Dog placed under observation; temperature subsided to region of normal after four days.

Tuberculin Tests.—

Ophthalmic
Intradermic
Epidermic
} were applied. No reaction observed.

Subcutaneous test. Dose—1 c.c. tuberculin at 8 a.m. Average initial temperature, 101·7°. Temperatures recorded after injection of tuberculin—

8 a.m.	10 a.m.	12 noon	2 p.m.
101·8	101·2	102·3	103·0
4 p.m.	6 p.m.	8 p.m.	
103·9	103·4	102·4	

Post-mortem.—Lesions confined to lungs. Multiple small hæmorrhagic foci under visceral pleura; an area of about three square inches of the left lung was adherent to parietal pleura in dorsal region, tubercle bacilli were present. No visceral lesions were detected. Type of bacillus, bovine in origin.

CASE No. 6.

Subject.—Manchester Terrier dog, two to three years old.

Owner.—Caretaker of flat, husband admitted to hospital 12 months before, suffering from pulmonary tuberculosis; since returned home and in better health.

Symptoms.—Facies characteristic. Temperature, 103·4°. All four legs abnormal and enlarged, especially in the region of joints; slight lameness. Respiration and lung sounds abnormal. Ailing for four months.

Tuberculin Tests.—Ophthalmic and intradermic tests, single applications, both negative. Subcutaneous test. Dose tuberculin—1 c.c. at 8 a.m. Average initial temperature, 102·5°. Temperatures recorded after injection of tuberculin—

8 a.m.	10 a.m.	12 noon	2 p.m.
102·6	102·0	103·4	102·9
4 p.m.	6 p.m.	8 p.m.	10 p.m.
101·4	101·0	101·5	101·6
12 p.m.	8 a.m. following morning.		
101·5	101·0		

Since Continental observers have stated that dogs react to a second dose of tuberculin administered subcutaneously on the day subsequent to the first test, it was decided to retest this animal. Twenty minims of tuberculin were injected at 10 a.m.; the following temperatures were registered—

8 a.m.	10 a.m.	12 noon	2 p.m.
101·0	102·4	103·0	103·0
4 p.m.	6 p.m.	8 p.m.	10 p.m.
103·0	102·0	101·0	101·0

8 a.m. following morning.
102·0

Post-mortem.—Posterior lobe left lung, apical and posterior lobes right lung involved, consolidated areas and numerous vomicæ present. These were irregular in shape and contained a watery, turbid fluid. The bones of the limbs, the pelvis and some of the vertebræ were extensively affected (see photos). Type of bacillus, of human origin.

CASE No. 7.

Subject.—Cross-bred Terrier, male, three years old.

Owner.—Proprietor of restaurant; animal was wife's pet, and spent part of his life in the public rooms.

Symptoms.—Facies characteristic, emaciation marked. Dorsal spines and ribs very prominent, ribs unduly prominent over hepatic area. Cough absent, appetite voracious. Lung sounds abnormal, abdomen abnormal on palpation.

Tuberculin Tests.—

Ophthalmic
Epidermic
Intradermic
} tests were applied. No reaction observed.

Subcutaneous test. Dose—1 c.c. tuberculin at 9 a.m. Average initial temperature—101·7°. Temperatures recorded after injection of tuberculin:

9 a.m.	11 a.m.	1 p.m.	3 p.m.
101·6	101·9	102·9	103·4
5 p.m.	7 p.m.	9 p.m.	
102·6	102·0	102·2	

Post-mortem.—Lungs showed multiple consolidated areas, the largest about the size of a pea; the mediastinum was thickened and showed small gelatinous-like rounded excrescences, bronchial and mediastinal glands were

enlarged and œdematous. Liver extensively involved, also portal glands. Both kidneys showed several greyish translucent areas on cortical surface, and on section several caseating areas were scattered through cortex and medulla. Spleen normal. Pancreas enlarged, and a number of yellow caseating centres were present. Omentum very thickened and contained several yellowish caseating areas. Mesentery involved: innumerable shot-like tubercles were scattered throughout its substance. Tubercle bacilli numerous in visceral lesions. Sputum and urine negative. Type of bacillus, of human origin.

CASE No. 8.

Subject.—Airedale dog, four years old.

Owner.—Private person, who had possessed the dog for several months.

History.—Wasting, discharging sinus from right side of pharynx, polyuria.

Symptoms.—Facies characteristic, emaciation, tumefaction of lymphatics in the region of the throat, and a sinus discharging a muco-purulent material. Heart very intermittent, marked rãles over the right lung. Temperature ranged between 101·0° and 102·6°.

Tuberculin Test.—20 minims of tuberculin were injected at 8 a.m. Average initial temperature—101·6°. Temperatures recorded after injection of tuberculin:

8 a.m.	10 a.m.	12 noon	2 p.m.	4 p.m.
102·0	102·8	104·0	103·6	104·2

6 p.m.	8 p.m.	10 p.m.	12 p.m.
103·5	103·1	102·7	102·5

Post-mortem.—Left lung all lobes involved; discrete tubercles varying in size from that of a hazel nut downwards, showing a pinkish-grey centre and surrounded by a dark purplish ring. On section, these appeared greyish-white and many showed areas of softening in their centres. Diaphragm free. Pharyngeal lymphatics extensively involved. These had undergone softening, and contained the characteristic milky-white fluid; a few yielded a yellowish custard-like pus. The latter were connected with the sinus opening on skin. Retropharyngeal glands were the size of a hen's egg and pressing upon the roof of the pharynx. Anterior portion of mesentery showed multiple small tubercles. Lymphatic glands of mesenteric area enlarged, œdematous and containing tubercles. Liver showed multiple whitish tubercles, scattered fairly evenly throughout the lobes, and varying in size from that of a shot up to that of a walnut. Both kidneys showed single small lesions on cortical surface, also slight interstitial nephritis. Pancreas and spleen normal. Abdominal diaphragm showed a yellowish, diffuse deposit.

CASE No. 9.

Subject.—Cross-bred mongrel Terrier dog, six years old.

Owner.—Private person; a man living on the ground floor of house and suffering from pulmonary tuberculosis was in the habit of expectorating about the premises; the dog had been seen to lick the expectorate.

Symptoms.—Facies characteristic, emaciation and cough. Temperature ranged from 101·4° to 102°. No further clinical examination was made.

Tuberculin Test.—20 minims of tuberculin injected at 8 a.m. Average initial temperature—101·8°. Temperatures recorded after injection of tuberculin:

8 a.m.	10 a.m.	12 noon	2 p.m.
101·8	102·1	103·6	103·0

4 p.m.	6 p.m.	8 p.m.	10 p.m.
102·9	100·4	100·0	100·0

Post-mortem.—Small papillomatous outgrowth centre left costal pleura, greyish and translucent, the size of a bean. Bronchial and mediastinal glands fused and about the size of a grape fruit and full of characteristic milky-white fluid. A few small discrete tuberculous lesions present in anterior portion of mediastinum. An encapsuled tuberculous mass, the size of a pigeon's egg, pendulous from pericardium. No other lesions visible in other portions of the body. Type of bacillus, of human origin.

CASE No. 10.

Subject.—Cross bred Samoyede dog, nine years old.

Owner.—The wife had died two years previously from pulmonary tuberculosis.

Symptoms.—Facies characteristic, emaciation marked, dulness over large areas very evident on auscultation of chest, friction sounds present over heart on left side. Left hind leg slightly enlarged. Temperature ranged between 102·5° and 99·6°.

Tuberculin Tests.—Ophthalmic, repeated after 24 hours—negative. Subcutaneous, 20 minims of tuberculin, injected 8 a.m. Average initial temperature—101·3°. Temperatures recorded after injection of tuberculin:

8 a.m.	11 a.m.	1 p.m.	3 p.m.
102·0	103·2	103·0	103·2

5 p.m.	8 p.m.	11 p.m.
102·5	102·0	101·0

Test repeated the following day—20 minims of tuberculin injected 28 hours after original dose of tuberculin:

12 noon	3 p.m.	5 p.m.	7 p.m.
100·5	99·6	100·4	101·0

9 p.m.	11 p.m.	1 a.m.
101·0	100·8	99·8

Dog extremely ill and in a state of collapse.

Post-mortem.—Both lungs, but more especially the left, were riddled with tubercles of varying size from 1 millimetre upwards. The posterior and middle lobes of the left lung were double the normal size and fibrous; the middle lobe was adherent to the bronchial glands, which were very much enlarged. The right lung was free of the larger lesions. The bronchial and mediastinal glands were enlarged, and fused together into one mass; whitish in colour, they were elastic and spongy under pressure and contained the characteristic milky-white coagulum and fluid, the latter mixed with flocculated particles. Suprasternal glands also enlarged, but softening less marked. Parietal pleura and diaphragm covered with low papilliform lesions up to 2 mm. in diameter, a few larger ones up to 1 cm. also present. Spleen enlarged and covered with small whitish spots resembling tubercles and less than 1 mm. in diameter. There were also some larger lesions, yellowish in colour, and up to 3 m.m. in diameter. Liver much enlarged, and covered with miliary tubercles, white in colour and varying in size from 1 to 2 mm. in diameter. Kidneys showed on each cortex five or six yellowish-white lesions up to 2 mm. in diameter; well marked chronic

interstitial nephritis was present. The bones of the left hind limb showed the characteristic changes.

. . . . . .

More recently, a tuberculin grown from tubercle bacilli of canine origin became available, but owing to unforeseen circumstances it was only possible to try this on one dog known to be affected with tuberculosis.

Subject.—Cross-bred Irish terrier dog, five years old.

Symptoms.—Those of pulmonary tuberculosis. The ophthalmic, endermic and intradermic tests were applied. As a result, a small bead of mucous appeared in the internal canthus of the tested eye a few hours after the instillation of the tuberculin, but was not thought to be of diagnostic value. The endermic test was negative. The intradermic test, the site being the inner surface of ear flap, gave rise to a well-defined swelling, the size of a shilling piece. After twenty-four hours a good deal of heat was present around the enlargement, but pain did not appear to exist.

The subcutaneous test was then carried out and the temperatures recorded were as follows:

Temperature limits over three days prior to test—102° to 103°. Average initial temperature—102·5°.
12·30 p.m. 1 c.c. canine tuberculin subcutaneously:

1 p.m.	3 p.m.	5 p.m.	7 p.m.	9 p.m.	11 p.m.
102·4	104·5	104·5	105·2	105·4	104·2

Post-mortem showed one lobe of left lung and the mediastinal glands to be extensively involved in a tuberculous process. Two small lesions were also present in the liver.

I wish to express my indebtedness to Mr. A. C. Dixon, M.R.C.V.S., late House-Surgeon, Royal Veterinary College, also to Mr. J. B. White, M.R.C.V.S., and Mr. J. S. Steward, M.R.C.V.S., late Assistant House-Surgeons, for assistance in carrying out the various tuberculin tests, and to Mr. Goodman, of the Research Institute in Animal Pathology, for his knowledge of photography.

Mr. Stableforth, B.Sc., M.R.C.V.S., D.V.S.M., of the Research Institute in Animal Pathology, has verified the diagnosis of tuberculosis in a great many of the cases recorded by various of the bacteriological methods. I am indebted to him for all information as to the type of bacillus present in the foregoing cases, and also for a supply of tuberculin of canine origin.

Finally, I would express the appreciation with which I have read "La Tuberculose des Carnivores Domestiques," by M. G. Lesbouyries, of the Alfort Veterinary School.

The Commons and The R.V.C.

In the House of Commons on 25th April, Viscount Sandon asked the Minister of Agriculture whether he had yet decided on any action to place the Royal Veterinary College on a modern footing.

Mr. W. Guinness (Minister of Agriculture)—No, sir. I am unable to come to a decision on this question pending the receipt of the Report of the Committee, to which reference was made in the answer given on my behalf to the question put by my noble friend on the 14th February last.

Viscount Sandon—It is a very long time ago.

Mr. Guinness—The Committee are still hearing evidence, though I understand they are approaching the end of their labours.

Stunning of the Pig by Electricity before Slaughter.

By C. H. Ducksbury, M.R.C.V.S., D.V.S.M., and D. J. Anthony, M.R.C.V.S., D.V.S.M.

An apparatus for stunning animals prior to slaughter, recently invented by Dr. Max Muller, of the University of Munich, and Chief Engineer Anton Weinberger, of Munich, was demonstrated upon pigs at the Bacon Factory of Messrs. C. and T. Harris (Calne), Limited, and in response to invitation was witnessed by us.

The apparatus, which was in charge of Herr Weinberger, consists of an electric transformer, two ebonite covered rods, each possessing a button switch, and connected by wires to the transformer, which is in direct contact by wire with the electric current at 200 volts. The ends of the rods placed against the animal's body have metal plates attached (electrodes) covered with cloth, and are dipped in salt solution before applying to each pig. Another type of electrode consisted of a semi-circular metal band, again covered with cloth; this is the so-called "Abdomen-electro" electrode.

In practice this apparatus is used with a pig trap, such as the "Van Dorp," the one electrode being placed upon the forehead, and the other on the middle of the spine, or behind the shoulder; when no trap is available the semi-circular abdomen-electrode is placed under the belly. Once the electrodes are in position the current is applied by pressing the button switches.

The demonstration, which lasted two days, was made upon animals as ordinarily purchased for the trade, and which had been subjected to *ante-mortem* inspection in the usual way. On the first day twenty-two bacon pigs and three sows were despatched by the method. In the absence of a pig trap one pig at a time entered a small pen adjoining the windlass or "hoist," and the semi-circular abdomen-electrode was used. Owing to the wandering of the animal this method was unsuccessful, and the current was better applied by using the plated electrodes, in this case one to the forehead, and one to the spine, about the region of the last few dorsal vertebrae. The current was switched on and released in six to ten seconds. Whilst the current was on the animal collapsed and lay on its side; at the same time, acute muscular contraction took place, the limbs being drawn up against the body, eyelids closed, head raised and back concave. Upon switching off the current a general relaxation of the muscular system took place and the animal trembled violently, marked tetany of the limbs being observed.

Realising that many authorities are of the opinion that capillary hæmorrhage in the muscles takes place during such convulsions, every effort was made to hoist and bleed the animals immediately the current was switched off. An unconscious state was apparently produced in all the bacon pigs, which were shackled and hoisted with ease. The application of this method to sows was not satisfactory; one sow after electrocution, although unable to rise, was able to struggle vigorously amidst much squealing, whilst another sow, a somewhat heavy-coated black, did not fall when the current was applied; in this case the operator splashed salt water over the back in order to get better contact. Here again the animal struggled vigorously,

her trotting movements being a hindrance to shackling for hoisting.

An inspection of the carcases and offals followed. The carcases had an intense red area on the backbone, which, on splitting down, revealed in many cases fractures of the dorsal vertebræ; also a purplish-red sub-pleural area, varying in extent, was observed in many of the animals.

Further inspection was delayed until twenty-four hours had elapsed to allow of the setting of the carcases.

The offals displayed a marked change, consisting of a general blood congestion, most marked in the "plucks," the livers of which were tinged bluish purple—a condition to be seen when pigs are driven to slaughter with an insufficient resting period.

The second examination of the carcases showed, in addition to the foregoing, a pinker fat, injection of the intercostal blood-vessels and increased moisture in the tissue on section. Furthermore, extravasations in varying sizes were most pronounced in the muscles of the chest, flank and leg (hams)—the so-called "muscle bleeding" or "blood splashing." In order to observe this condition a sharp knife is used to cut thin layers of flesh, which are then held up to the light.

The carcases were prepared as Wiltshire sides of bacon, the scapulæ being removed with portions of muscles attached. An experiment was now carried out in order to compare the blood content of these muscle fragments with those of pigs killed in the ordinary way.

The method used was that of Dr. Leonard Hill, M.B., F.R.S., described in a paper on "The Humanity of the Methods of Slaughter," reprinted from *The Lancet*, 1923, 11, 1382.

In each case the muscle fragments were removed and finely minced: then 2 grs. of each were placed in 20 c.c. of water. The colour of the mince was set free by freezing and thawing; the solution was then filtered. These filtrates, using 3 cc. each time, were examined spectroscopically, when the characteristic absorption bands of hæmoglobin were observed. Dilutions of these solutions were made gradually with water, and such quantities noted at a point where the hæmoglobin bands almost disappear; thus it was found that the filtrates from three pigs killed in the ordinary way required 2.3 c.c., 2.9 c.c., and 2.2 c.c. of added water, giving an average of 2.5 c.c., approximately, whereas the filtrates from three electrocuted pigs required 7.9 c.c., 11.5 c.c., and 8.5. cc.. of added water, with an average of 9.3 c.c. Thus the ratio of the hæmoglobin content in the muscles of the electrocuted pigs to ordinarily-killed pigs was 12.3: 5.5; therefore, the blood content of the electrocuted was greater than that of the ordinarily killed.

This experiment was conducted by Mr. J. Haddon, B.Sc., of Calne, to whom we are greatly indebted for the use of apparatus and the care and interest taken by him in the experiment.

The second day eight bacon pigs and two sows were dealt with. A wooden trap was constructed in order to facilitate the work. This demonstration was very similar to the first. In order to avoid the intense red area on the backbone, the electrode was placed in the shoulder region; this method was found to cause fracture of the scapula in many cases.

A further comparison of the relative amounts of hæmoglobin in the solutions, prepared as in the previous experiment, was made. This test was conducted in a more elaborate manner, providing greater accuracy, in the Optical Research Laboratory, at the University College of South Wales, Cardiff, and we are greatly indebted to Dr. Shaxby for the work done.

A spectro-photometer was used and material from four pigs ordinarily killed and four pigs electrocuted was examined. The results were based upon the transmission of light through the filtrates, a quantitative measurement of the absorption being taken at three wave lengths of the spectrum, and the percentage of light transmitted calculated. The results showed that more light was absorbed by the material from electrocuted pigs than by the material from the ordinarily-killed pigs, indicating the presence of a greater amount of blood in the former.

We are of opinion that, in its present state of development, this method of stunning by electricity is unsuitable for application to bacon pigs, owing to the damage to the carcase, inferior appearance, and reduced keeping qualities of the meat, due to its increased blood content.

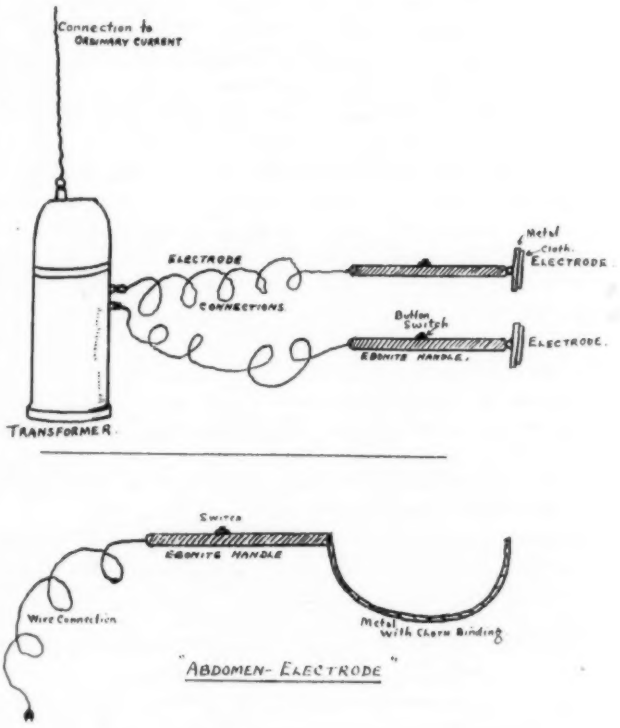


Diagram of "Muller-Weinberger" Electric Slaughtering Apparatus.

R.A.V.C. Golfing Society: 1929 Meeting.

We are asked to add to the information relative to the Annual Meeting of the Society given in our issue of April 27th (page 352), that Territorial Officers are eligible to compete.

A Visit to the Veterinary School at Zurich.

By PAUL CROSFIELD, Class C., Royal Veterinary College.

Reminiscences of a holiday abroad—as such—may, at first sight, seem out of place in the *Veterinary Record*, but as that holiday included a visit to the Veterinary School at Zurich, the venue of the recently-held Congress of the Royal Institute of Public Health, which was attended by many veterinarians from this country, the following brief note may be of interest. It is to be hoped that such contacts as these may, in however small and indirect a way, contribute something to that internationalism of Science whereby we may best achieve true progress.

The Principal of the Veterinary School at Zurich, Dr. Ackerknecht, to whom I sent a letter of introduction from Professor Hobday, was kind enough to assure me that I should be welcome to see as much at the School as my time allowed. He himself was away; but I must place on record my appreciation of the great kindness—and forbearance—shown me by all with whom I came in contact. Particularly am I indebted to Professor Dr. Frei, of the Department of Physiology and Pathology; and to Herr Degen, whose post is comparable to that of House Surgeon at the R.V.C., and to whom fell the task of escorting me round the school and clinic, which is run on much the same lines as our own; save that there is much cattle work.

The oldest building has stood for two hundred years, yet is still in good repair, and gives an impression of cleanliness and usefulness most refreshing after Great College Street. The new building, containing laboratories, museums, and class rooms is extremely modern and well arranged; particularly was I impressed by the anatomical and pathological collections. The *post-mortem* and operating theatres, too, are clean and efficient.

Certain outstanding impressions naturally recur to my mind when thinking over my visit. The first—and perhaps the most striking—was that every member of the staff was a *Scientist* in the fullest sense of the word. This is perhaps due to the close connection of the School with the University (by which the elementary science is taught), and any specially interesting case is studied in conjunction with specialists. For instance, I witnessed a *post-mortem* on a dog which, in life, with no sense of smell, sight, hearing or feeling, exhibited constant circus movement to the left. An eminent brain specialist from the Medical Faculty was present, and was keenly interested.

Secondly, when talking to a pathologist, I expressed regret (*vide* the Professor of Pathology at the R.V.C.) that our pathology course only covered one year. Imagine then my surprise (and delight!) when he replied "Oh, a year's pathology is quite enough for a veterinary surgeon unless he is going to take up some official post."

Thirdly, though I have always been convinced that Latin should be a compulsory subject everywhere, its inestimable value was brought home to me afresh at Zurich. Time and again when my German proved unequal to the strain of scientific exposition, the difficulty was tided over with the help of Latin. Perhaps, therefore, Professor Hobday might include "polishing up one's Latin" among the broadening and stimulating effects of travel abroad.

H. M. STATIONERY OFFICE PUBLICATIONS.

	Price Net	Post Free
HOUSE OF COMMONS BILLS.	s. d.	s. d.
97. Slaughter of Animals. To provide for the Humane Slaughter of Animals	0 2	0 2½
AGRICULTURE AND FISHERIES, MINISTRY OF: Diseases of Animals:— Handbook of Diseases of Animals Acts and Orders thereunder, January 1st, 1926. Amendments No. 4, including revised index, March 11th, 1929 (24-0037-04-00)	0 3	0 4

CLINICAL AND CASE REPORTS.

Equine Tuberculosis.

By R. H. SMYTHE, M.R.C.V.S., Camborne.

Subject.—Brown Shire mare, sixteen hands, aged ten years. Weight, sixteen hundredweight. Employed in farm work.

History and Symptoms.—The mare reared a foal in 1923, but had not been put to service since. In January of this year I was asked to determine if she were pregnant, as it was possible that a stray pony stallion might have served her. The girth of the abdomen was slightly increased, with moderate œdematous swelling in front of the udder, extending forward to the umbilicus. The mammæ were swollen, congested and rather painful on palpation. A thin, watery fluid could be drawn from the teats. Rectal examination revealed a non-gravid uterus, of normal size, but both ovaries were enlarged and cystic. Owing to the size and disposition of the mare, it was not possible to examine beyond the pelvic region. At this stage, aperients, pot. iodid. and belladonna were administered internally, and a liniment containing lead acetate and belladonna applied to the udder.

A week later, the enlargement of the mammæ had greatly increased and lactation was fully established, the appearance being that of a recently-foaled mare. Milk of normal appearance dripped from each teat, and owing to the congested state of the udder, it was considered advisable to withdraw this at intervals. It should be mentioned that, at this time, the mare was stopped from work for a week, but apart from this rest she did light duty until a few days before her destruction, nearly four months later. Active lactation continued for a fortnight and after this period the intervals between milking were progressively lengthened. The character of the secretion changed from normal milk to a clear, watery fluid and at the same time the udder became gradually harder to the touch, with further increase in size.

On one or two occasions hæmaturia was observed, and moderate diarrhœa, of two days' duration, occurred once only. Simultaneously with the diminution of the milk secretion, lachrymation from both eyes commenced, with some degree of photophobia. The discharge was clear and watery and constantly dripped from the eyelashes. A few days later, slight opacity of the corneæ appeared, followed by ophthalmia. The eyeballs gradually atrophied, the lids closed over them and complete blindness resulted.

At the third month of visible illness, apart from the œdema of the abdominal wall, several hard, circular, well-defined swellings appeared in the subcutaneous tissues of the inner aspect of the thighs, lower chest walls and in front of the sternum. They appeared quite painless.

During the whole of this time the mare seemed perfectly fit, apart from blindness; she ate and drank well and maintained weight. She did light work about the farm willingly and appeared in good spirits. There was a complete absence of cough, dyspnœa or other definite symptom. Temperature never exceeded 103° F. The mare was destroyed on the first of May, chiefly on account of her blindness.

Post-mortem.—The carcase appeared well nourished. On dividing the skin in the mid-abdominal line, a quantity of straw-coloured fluid escaped. The skin was removed, exposing the subcutaneous swellings, which were incised and found to consist of fibrous tissue, but no evidence of tuberculosis was visible to the naked eye.

The abdominal tunic was six inches in thickness and infiltrated with a yellow, transparent, jelly-like substance. A moderate quantity of slightly blood-stained peritoneal exudate was present. The carcase was very fat throughout, particularly as regards the omentum. Practically the whole of the parietal peritoneum and the greater part of the visceral was obliterated by tuberculous nodules, but there was complete absence of adhesion. The spleen contained nine large nodules. All the visible abdominal lymphatic glands were enlarged and caseated, some having attained the size of a coconut. The liver and kidneys held large caseating areas. The mucous membranes of the small intestine contained, at intervals of from a few inches to a foot, single, raised ulcers, about a quarter of an inch in diameter, with caseating centres. The interior of the large intestine was only slightly affected. The total weight of the ovaries was three pounds; they contained large multiple cysts, but no other evidence of tuberculosis.

Both lungs were studded with tubercles of various sizes, the lower edges and the apices being quite solid, and although both the pleural layers were thickly encrusted with "grapes," there was complete absence of adhesions.

The udder weighed twelve pounds and was almost completely fibrous. The upper halves contained miliary tubercles and both supramammary glands were caseated and so intimately connected with the udder tissues as to render dissection impossible.

The eyes, when removed from the orbits, appeared about half their natural size. The cornea of each was half an inch in thickness, densely fibrous and of a yellowish-red colour. A few small vessels had penetrated their periphery. In each, the iris had practically disappeared, as such, and was represented by a small, sticky, black mass on the floor of the anterior chamber. Aqueous humour was scanty, but the lens, vitreous humour and posterior part of each appeared normal.

Remarks.—The chief features of interest in this case were the extent and severity of the lesions and particularly their wide dissemination. The maintenance of appetite, weight, internal fat, and working ability under such circumstances, was somewhat remarkable, whilst the absence of definite symptoms usually associated with equine tuberculosis rendered diagnosis difficult. In spite of the widespread nature of the disease, there was no evidence of "stiff neck" or other joint lesion.

Urticaria in a Mare.

By Geo. F. Boddie, B.Sc., M.R.C.V.S., Auchterarder.

Subject.—Six-year-old Clydesdale mare, which had had three foals, the last in May, 1928.

History.—The mare suckled her foal throughout the summer and it did very well. The mare and her foal were taken in to the foal sales at Perth in September, and the foal alone was sold. The mare was taken by train to a farm about three miles from her home; she remained there in a field for two days and was then walked home. On arrival she appeared dull, but about four hours later she was seen to be very ill, and I was sent for.

Symptoms.—The mare had the appearance, when seen at 4-0 p.m., of a very sick animal. The extremities were very cold, the temperature was 101·6° F., and the pulse was more than alarming, being 108, soft and poorly filled.

Over the whole of the body there were plaque-like swellings about the size of five shilling pieces; over the lower part of the face and the nostrils these swellings were run together into a tense œdematous mass.

The udder was tense but not painful, and the flow of milk was restricted.

Diagnosis and Prognosis.—Urticaria, due to the sudden check in the removal of the milk. The metabolic disturbance was sufficient to cause a guarded prognosis to be given.

Treatment.—Warm clothing, combined with vigorous grooming. Massage of the udder and frequent withdrawal of any milk that there was to be obtained by hand milking. Hypodermically, arecoline hydrobromide, gr. i, was given.

Course of Illness.—Seen the next day, the mare appeared very much better. The temperature was 99·8° F., and the pulse was now 48 and quite strong. The swellings were very much reduced and the flow of milk was more free. On the following day the temperature and pulse were normal and the mare was feeding freely, the food consisting of bran mashes, hay, and plenty of drinking water. The swellings were now all dispersed, except for that under the breast, which took nearly a week to go away.

Treatment now consisted of saline laxatives with soft food, and continued partial emptying of the udder until the flow of milk ceased. Complete recovery appeared to take place in the course of a few days.

Six weeks later, however, the mare cast a dead foal, which fact the owner unfortunately neglected to tell me until some weeks had elapsed, so I did not have an opportunity of examining it.

I should be interested to hear if this condition is common in mares which are suddenly deprived of a suckling foal and in which there had been no attempt made to withdraw the milk or to reduce the amount of the flow.

Personal.

Birth.—April 12th. To Margaret Christina, wife of G. H. Leader, M.R.C.V.S., of 10 East Castle Street, Bridgnorth—a son.

Mr. J. F. D. Tutt, of Winchester, writes to point out that the name "J. Tutt, Junior" appearing in the attendance list in our report of the meeting of the Southern Counties' Division, N.V.M.A., at Bournemouth, on March 28th, bore no reference to him, as he neither belongs to the Society nor has attended any of its meetings.

Dr. H. A. Cookson, Pathologist to the Royal Infirmary, Sunderland, requests us to state that, in connection with his article on Melanosis, which was published in the *Record* of April 20th last, he is indebted for the greater part of the Bibliography to a member of the Staff of the Department of Pathology, Royal (Dick) Veterinary College, Edinburgh.

From The Veterinarian, May, 1828.

Acupuncturation in Veterinary Practice.

By W. —

The operation of acupuncturation is of Eastern origin. It is said to have been invented by the Chinese, and by them transmitted to Japan. Some allusions to it occur in a few medical writings towards the close of the seventeenth century, but the practice of it has only very lately been adopted by European surgeons. The wonderful tales that were related of its almost magical effects in Eastern climes have not been fully realised, and some eminent practitioners have even ranked it with the absurd reveries of animal magnetism. Experience, however, has shown that it has great power in relieving many painful and obstinate nervous and muscular affections. On its theory mystery rests, and which I shall not attempt to develop.

I am not aware that it has been resorted to by any English veterinarian, except that I once used it with considerable good effect in a case of chorea consequent on distemper in a bitch. Some French veterinarians have given it an extensive trial.

It was first used at the Veterinary School at Alfort, on a paralytic bitch, but without effect.

In May, 1825, M. Chenel tried it in a case of chorea in a dog. One of the hinder legs was principally affected. Six needles were inserted in the thigh, and retained eight minutes. The insertion appeared to give very great pain, but the animal was tranquil while they remained in the thigh. On the following day six were inserted more deeply, and they remained twelve minutes, and on the succeeding day eight needles, which remained twelve minutes, and, after that, eight needles for twenty minutes. The pain was excessive—the whole of the limb swelled enormously—the dog refused his food, and a high state of fever was excited. The inflammation and swelling, however, rapidly abated; the twitchings subsided, and in twelve days from the first insertion of the needles the dog was cured.

His second experiment was on the scirrhous testicle of a dog. This completely failed. Enlargement, and pain, and general fever ensued, and the animal was relieved by castration.

His third experiment was on a mare with an old supposed rheumatic lameness of the hip joint. Fifteen needles were inserted on the first day, and twenty on the second and third days, and they remained an hour. The pain of insertion was very great, but the needles being once inserted the mare was quiet until they were withdrawn. She was taken away a few days afterward, but M. Chenel was informed that she became perfectly sound.

M. Charles Prevost next follows. His first case was that of a mare with rheumatism in both shoulders. Ten needles were inserted in each shoulder, and retained three hours; at the expiration of two days twenty needles were used, and not withdrawn until the expiration of twelve hours. Four days after this, thirty-six needles were applied and continued twelve hours. The animal suffered dreadfully at each insertion, but was cured in three weeks.

Another mare had rheumatism about the hip joint. First ten, then twenty, and then thirty needles were employed, and in three weeks the lameness had disappeared.

M. Clichy was consulted respecting a mare that for fifteen or sixteen days had been so lame in the near fore leg as to be unable to put it to the ground. The lameness had followed a violent slip. No heat or swelling could be perceived. M.C. attributed the lameness to a sprain of the extensor muscles of the fore arm and determined to use the needles. On September 24th, 1826, six needles were inserted round the articulation of the scapula with the humerus. On the 25th, he applied twelve, and more deeply, and left them eight hours. Not only during the insertion, but while the needles remained in the animal, extreme pain appeared to be suffered.

On the 27th, eighteen needles were introduced, and remained twelve hours. On October 1st, no relief had been experienced. Thirty needles were then employed, and more deeply, and thirty-eight on the seventh. On the 13th, forty needles were used. They penetrated to the depth of 1½ inches, and were retained thirty hours.

On the 23rd, twenty-four needles were inserted to the depth of 2½ inches, during which operation the animal is said to have suffered excruciating pain. On November 3rd, thirty needles, and on the 13th, thirty; and on December 10th thirty more were used. The lameness then began to abate, and on the 10th of January, 1827, the horse was sound.

M. Bouley plunged twenty-four needles into the muscles of the loins of a horse whose hinder extremities were paralysed. No good effect was produced.

On the whole these experiments have been very unsatisfactory. One case of chorea in the dog was cured by acupuncturation and another relieved. The attempt to reduce a scirrhous testicle utterly failed. Two cases of supposed rheumatism were cured, but not in so short a time as that in which we generally succeed in removing a rheumatic affection by other means. In strain of the extensor muscles of the fore-arm, M. Clichy laboured hard for nearly three months, and although, at last, the lameness was removed, the cure is to be traced to the state of rest in which the animal was suffered to remain so long, more than to the influence of the needles. In paralysis of the hinder extremities, acupuncturation was totally useless.

From so few facts, however, we cannot draw any satisfactory conclusion. Two things, however, are sufficiently evident, that the sudden and magical relief which the human being has sometimes experienced has not been seen in the horse; and that, probably from the thickness of the integument, the animals suffered extreme torture during the insertion of the needles.

Those veterinarians who practice on so humble an animal as the dog, will, perhaps, try the effect of acupuncturation in that nervous affection which so much resembles the St. Vitus's Dance in the human being. Rheumatic affections, especially if accompanied by considerable spasmodic action, and which have then occasionally puzzled our most skilful practitioners, are fair cases for experiment; and I do trust that some zealous veterinarian will put the use of the needle fairly to the test, in that most dreadful and untractable disease, tetanus.

R.C.V.S. Library.

The undermentioned acquisitions have recently been made to the Library of the R.C.V.S.:—

"Factors that Influence Wool Production with Range Rambouillet Sheep" *U.S. Technical Bulletin.*

"Collected Articles on Swine Practice," *Veterinary Medicine.*

"Studies in Dog Distemper, Nos. 4 and 5," Laidlaw and Dunkin (reprints).

"The Immunisation of Dogs," Laidlaw and Dunkin (reprint).

"The Standardisation of Tuberculin," Okell and Parish (reprint).

"Modern Abattoir Practice and Methods of Slaughtering," Hal. Williams, 1923 (reprint).

"Carbontetrachloride in Liver Rot of Sheep," Montgomerie (reprint).

"Observations on Artificial Infestation of Sheep with Fasciola Hepatica and on a Phase in the Development of the Parasite," Montgomerie (reprint).

"The Host Relationship of the Trematode Genus Zygocotyle," Price (pamphlet), 1928.

"On the Fight against Infectious Abortion by means of Systematic Blood Examination combined with Isolation and Disinfection," Axel Thomsen (pamphlet).

Any of the above-mentioned pamphlets may be borrowed from the Library by members of the College on payment of postage both ways. Applications should be made to the Librarian, R.C.V.S., 10 Red Lion Square, London, W.C.1.

REVIEW.

[Minerals in Pasture and their Relation to Animal Nutrition. J. B. Orr, M.D., D.Sc. Pages XVI×150. Price 10/6 net].

Though for many years past it had been considered probable that the continuous cropping of natural pastures by stock, without compensatory return to the land of the nutriment withdrawn from it, must have a mineral-depleting action, and thus reduce the nutritive value of the herbage, lack of funds and opportunity for research precluded any serious attempt at investigation into a problem that is of supreme importance. Within recent years, however, the need for research into the real value of pastures and into the hitherto-presumed connection between pasture and ill-health has been recognised. Funds, staff and equipment once provided, the fascinating and, as has now been shown, profitable enquiry had scarcely begun before research workers in widely-separated areas the world over commenced to augment the store of new knowledge. Indeed, it is difficult to visualise any section of animal husbandry that has received such intensive study in a decade as the subject dealt with in the book under review.

As Major Elliot in his prefatory remarks says, in 1926 the Civil Research Committee of the Cabinet appointed a Sub-Committee of experts and administrative officers to consider and report on the relationship between the mineral content of pastures and their nutritive value. Clearly an essential and indeed initial part of such work would be the search of the literature and its cohesion into a form to which investigators could have ready access. This book is the result of such labour. Not least of the modern research worker's tasks is hunting through, when he can obtain them, the numerous scientific publications for information connected with the work on which he is engaged and, unless fortunately located, this task may be one of extreme difficulty. So numerous and so dispersed has been the issue of papers dealing with the mineral content of pastures that the publication of this book will be received with more than an ordinary welcome. The search of the literature for the purpose of its embodiment in this convenient form was carried out by Miss H. Scherbatoff, to whom all those interested in the subject will extend their gratitude. Some idea of the thoroughness with which the records of workers have been searched for, studied and epitomised, may be gained from the fact that in the 146 pages of the text, 292 authorities are quoted and references are made to no fewer than 366 publications.

The ground covered in the text is wide and deals with the mineral content of pastures, the factors affecting the mineral content, the conditions under which diseases due to deficiency of minerals in pastures may occur, the deficiency diseases of various animals in different parts of the world and other cognate matters.

Our personal appreciation of the result of the Author's and Miss Scherbatoff's joint labour can best be expressed by quoting with approbation a passage from Professor Cathcart's contributory Foreword :—"In this monograph there is a wealth of illustrative instances and analyses, evidence of concentrated attention and labour. It is a record of patience, thought and skill."

In view of the certain issue of further editions of this work, one would like to suggest that its value would be enhanced tenfold were an Appendix to be included discussing recent and approved technique for ash analysis. If the results of research workers are to be of real value, not only must uniformity be achieved, but technique must be correct, so as to minimise as much as possible the margin of error. For example, on page 27 :—"Lawes and Gilbert found a higher percentage of sulphur in leguminous plants than in grasses. They also found that the amount of sulphur increased throughout the season. Their figures, which were obtained by analysis of the ash, are, however, probably much too low owing to loss of sulphur in the process of ashing. Godden's figures were obtained by a method adapted to avoid such loss."

What is Godden's method ? Is it an improvement on the methods used by other contemporary analysts ?

While primarily intended for research workers, this book will be found of great interest to veterinary practitioners, as the Author states that the chief interest has been the influence of the composition of the herbage on the nutrition of the grazing animal, the work being done from the veterinarian's point of view.

R.G.L.

Ultra-violet Light Treatment of Pruritic Conditions

"Properly to place the value of U.V.L. with regard to skin symptoms which are frequently and loosely called pruritus, is rather a problem," writes Dr. Edward J. Deck in *The Actinic Practitioner*, "because the meaning of the word is an 'itching' and so many skin diseases are associated with 'itching' which would not for a moment fit in with the commonly accepted idea of the meaning of the term pruritus. Let it therefore be understood that for the purpose of this note the two conditions known as pruritus ani and pruritus vulvæ are alone under review. Both these conditions may be due to a variety of causes, and it largely depends upon a correct diagnosis as to cause, whether U.V.L. is to be of value or not. Suppose for illustration, the skin condition has been induced by pediculi, it is hardly necessary to resort to U.V.L. to effect immediate relief ; on the other hand, if irritation has led to sufficient scratching and a secondary eczema has started, U.V.L. is undoubtedly of great value. In the cases of more obscure origin where possibly some bowel toxæmia has started a highly irritable condition of the sensory nerves, to suggest that U.V.L. is a cure is on the face of it absurd, and the most that can be claimed for it is that it does give some very temporary relief from the intense irritation.

"To sum up : the cause of pruritus should always be ascertained if possible ; when removed the local condition will speedily respond to applications of U.V.L. from either the M.V.L. or Tungsten arc. Dosage should be regulated on the lines laid down for the treatment of eczema."

Army Veterinary Service.

Movements of Officers.

Major P. D. Carey is at present in this country on leave from India.

Major W. M. Rouse was posted from Woolwich to Hounslow for duty on the 4th instant.

. . . . . .

London Gazette—War Office—Territorial Reserve of Officers.

May 10th—The King has been graciously pleased to confer the Territorial Decoration upon the following Officer under the terms of the Royal Warrant dated Oct. 13th, 1920 :—Maj. T. Finch, M.C., F.R.C.V.S. (T. A. Res. of Off.).

ABSTRACTS.

[The Treatment of Canine Piroplasmosis. Considerations pratiques sur le traitement de la piroplasmose du chien. CUILLÉ, J., et DARRASPEN, E., *Rev. Gén. de Méd. Vét.*, 1929. March. T. xxxviii. No. 447, p. 138.]

Since 1922, the authors have treated numerous dogs affected with piroplasms by means of intravenous inoculations of trypan blue and have confirmed the remarkable specificity of this drug.

Donatien and Lestoquard have already reported favourably on the action of this drug in *P. bigeminum* infections in cattle and *P. caballis* in the horse. They have noted, however, that concentrated solutions of the drug may provoke alarming symptoms and even the death of the animal. This is due, in all probability, to the liberation of large quantities of toxin through the sudden lysis of the parasites. For this reason, they recommend that the dose should not exceed 0·1 gm. to 0·2 gm. for cattle of 200—300 kilogrammes.

In the dog, these reactions do not occur even with concentrated solutions of the drug. Moreover, the parasites are not entirely destroyed unless a dose sufficiently large to stain the mucous membranes, is given. The intravenous inoculation of 1 centigramme per kilogramme body weight will cause the mucous membranes to become stained, the temperature to fall to the normal and the parasites to disappear from the peripheral blood. If this does not occur, it is advisable to give a fresh inoculation of the same or even double the dose.

In order to prepare a concentrated solution, the following procedure is recommended :—

The powder is thoroughly mixed with two or three drops of 90 per cent. alcohol in a mortar. Then sterile hot water is added with frequent stirring to ensure a perfect solution of the drug. The injection is made as soon as the solution has reached the proper temperature.

The general anæmic state can be treated by the inoculation of colloidal iron or by blood transfusions.

[The Electrical Stunning of Cattle (intended for slaughter). KOSLER (1928), *Zschs. f. Fleisch. v. Milchhyg.*, 38, 16, 284-5.]

Experiments carried out on cattle in Stuttgart, using a continuous current of 110-120 volts. As electrodes, a 0.06 gm. copper plate laid on the loins moistened with water, and a brass tube, placed in the mouth like a " bit," were used. Immediately after the turning on of the current, the animal sank to its knees and then lay out flat. Consciousness was entirely gone, but returned in 2—3 minutes on " switching off." Re-application again brought about unconsciousness. The actual bleeding could then be carried out with ease and without pain to the animal.

. . . . . .

[On the New Method of Electrical Stunning. FRICKINGER (1928), *Dtsch. Schlachthof-Ztg.*, 28, 6, 83-4.]

Witnessed the stunning of two oxen and two calves by this method. Is high in praise of its speed and humanity. There is no danger to the operator.

. . . . . .

[The Further Electrical Stunning (Operations) at the Berlin Slaughter House, and other Points about Stunning. JUACK (1928), *Dtsch. Schlachthof-Ztg.*, 28, 9, 132-3.]

Doubts the humanity of the operation. He had noted headlong fall immediately on the switching on of the current. Also he is not convinced of the freedom from danger, particularly when the floor, as is usual in slaughter houses, is wet.

. . . . . .

[The Electrical Stunning of Cattle (intended for slaughter) RASCHTE, OTTO (1928), *Ztschr. f. Fleisch. v. Milchhyg.*, 38, 12, 209-14.]

Reviews the literature on electricity and its effect on the animal body. His own experience is that animals may be stunned by electricity in a humane manner.

[Human Malta Fever Infection of Bovine Origin. MESSIERI, A. *La Nuova Vet.*, 1928, No. 1, pp. 3-11.]

The author has collected a number of cases both from literature and from communications from Italian veterinarians, where human Malta fever disease was referable to bovines.

(1) 16 people who, 10 days after contact with an aborted cow and its fœtus, sickened nearly simultaneously with Malta fever.

(2) 6 people sickened with the disease after participation in the calving of an aborting cow.

(3) 1 person under similar conditions to the preceding.

The author puts forward the suggestion that perhaps only an occasional strain of *B. abortus* is pathogenic for man, perhaps those strains originally of goat or sheep origin ; it may also be that only in special circumstances is *B. abortus* pathogenic for the human subject.

[Experiments with Horse Grooming Machines. ECKERT and FRITSCH (1928). *Ztschr. f. Vet.-Kde.*, 40, 2, 55-69.]

A number of machines was tried, some of a suction, others of a rotatory brush, action. None fulfilled all desirable demands, but a few were of a very helpful nature, if two hand groomings were given twice weekly. The noise of the machine was a disadvantage with restless animals.

[The Action of Drugs on the Kidney. VERNEY, E. B. (*Quart. Jour. Pharm.*, I, 4, 1928). Ex. *Pharm. Journ.*, No. 3415, Vol. 122.)

Digitalis, although most effective as a diuretic in cardiac œdema, especially when accompanied by auricular fibrillation, can be shown to produce an increase in the rate of urine elimination. So far as it goes, the evidence does not militate against the view that digitalis and its allies produce an increase in the flow of urine by increasing the glomerular pressure. Adrenalin and pituitrin exert their diuretic effect through the increased volume of the glomerular filtrate. The diuretic action of the caffeine group is largely due to an increase in the rate of glomerular filtration. The chemical changes in the urine during caffeine diuresis lend further support to the view that the seat of action of this drug is primarily and chiefly the glomerular part of the renal secretory mechanism. Theobromine and

(*Continued at foot of first column next page.*)

The Medical Profession and Unqualified Veterinary Practice.

The British Medical Journal of May 11th publishes, under the above heading, the following letter from Dr. Fred Bullock, Secretary of the Royal College of Veterinary Surgeons :—

SIR,—May I be given an opportunity of asking the sympathetic attention of the medical profession to the following matter ? In a recent action for slander brought by an unqualified woman practitioner against a qualified veterinary surgeon, the plaintiff called three medical practitioners to testify as to her skill in the medical and surgical treatment of animals : Dr. X said he had sent animals to the plaintiff and had also recommended her to patients of his ; she had been extraordinarily successful in her treatment of the animals ; Dr. Y said that for a good many years he had sent animals to the plaintiff for treatment, and that he was satisfied with the treatment ; Dr. Z said she had sent a dog, which was ill from obstruction of the bowel, to the plaintiff and she had treated it successfully.

These three medical practitioners appear to be well aware that the plaintiff is an unqualified person, but nevertheless they not only consult her, but recommend her to others. May I suggest for the earnest consideration of your readers that it is to be deprecated as a matter of principle that members of the sister profession should give their support to unqualified persons in animal medicine and be willing to come forward and give evidence in their favour. I think it will be agreed by medical men that it is not necessarily certain that a medical practitioner is competent to judge whether any particular treatment is the correct treatment to give in the case of ailing animals, yet to a jury of unprofessional people the fact that members of the medical profession were on the side of the plaintiff would be likely to lead them to believe that the plaintiff was in some manner qualified.

Medical men ought really to be the last to give encouragement to unqualified practice in any form, and I plead that they should treat the sister profession with some sympathy. The two professions are closely related ; the laws governing them are practically identical ; the same professional discipline is applied to practitioners in both branches ; and, as much recent work has shown, they are close allies in research. Let us, therefore, be allies in protecting the public.—I am, etc., FRED BULLOCK,

Secretary and Registrar.

Royal College of Veterinary Surgeons,
London, W.C.1, *May 4th.*

(*Continued from pevious page*)

theophylline have a similar action. While part of the diuretic response to urea and sulphates is glomerular in origin, the main part would seem to be due to their inhibiting the re-absorption of water in the tubules. Small doses of cantharidin, uranium, and aloin may increase the flow of urine, and the occasional efficacy of calomel in removing the fluid which has accumulated in the tissue spaces in some forms of cardiac insufficiency seems beyond dispute. It would be premature, however, to hazard an opinion as to the mechanism by which such drugs as these produce an increased flow of urine.

'Odylen.'

By G. W. CLOUGH, Royal Veterinary College, London.

'Odylen' is a product manufactured by the Farbenfabriken vorm. Friedr. Bayer and Co. The manufacturers state that it is a combination of 80 per cent. 'Mitigal,' "an oil sulphurised in the nucleus with a 25 per cent. sulphur content" and 20 per cent. 'Nediwon,' "a mixture of high-molecular ketones."

From a specimen of 'Odylen' I have separated a solid which, after crystallisation from glacial acetic acid, formed pale yellow needles melting at 123° to 124° C. This crystalline substance produced an intense blue colouration with concentrated sulphuric acid. From the analytical figures (carbon 68·8 per cent., hydrogen 4·9 per cent., and sulphur 26·2 per cent.) the formula $C_{14}H_{12}S_2$ was deduced. The composition and properties of the compound indicate that it is identical with that prepared by Fries and Volk by the action of concentrated sulphuric acid on thio-*p*-cresol (*Berichte der deutschen chem. Gesellschaft*, 1909, *42*, 1173).

These authors found the melting point to be 123° C. and showed that it was 3·7 (2·6)—dimethyl-thianthrene :

$$(CH_3)C_6H_3\begin{matrix}S\\ \diagup\ \diagdown\\ S\end{matrix}C_6H_3(CH_3)$$

Cohen had previously condensed sulphur chloride with toluene by means of the aluminium-mercury couple and obtained an uncrystallisable oil boiling at 230°—235° at 60 mm. pressure. This product was evidently a mixture of isomeric dimethyl-thianthrenes :—

$$2CH_3.C_6H_5+2S_2Cl_2 = CH_3.C_6H_3\begin{matrix}S\\ \diagup\ \diagdown\\ S\end{matrix}C_6H_3.CH_3+2S+4HCl$$

The greater portion of the residual liquid in 'Odylen' possesses a composition and properties of a thianthrene and appears to be similar to Cohen's product (*Trans. Chem. Soc.*, 1899, *75*, 887).

F. Bayer and Co. have described the preparation of an oily product obtained by the interaction of sulphur and toluene in the presence of aluminium chloride (*German Patents* 365169 and 376718). In an example 1,000 parts of toluene when heated with 330 parts of sulphur and 80 parts of aluminium chloride gave a yield of 500 parts of an oil distilling at 150° to 230° under a pressure of 3 mm. The oil was stated to have considerable action against scabies. The reaction described in the specification is an application of the well-known Friedel and Craft's reaction, and a product similar in composition to those obtained by Cohen and by Fries and Volk is evidently obtained :—

$$2CH_3.C_6H_5 + 4S = CH_3.C_6H_3\begin{matrix}S\\ \diagup\ \diagdown\\ S\end{matrix}C_6H_3.CH_3 + 2H_2S$$

'Odylen' thus consists largely of a mixture of isomeric-dimethyl-thianthrenes (dimethyl-phenylene disulphides) which may be prepared by the method described in the German patents.

The thianthrenes are chemically stable compounds, the atoms of sulphur being firmly attached to carbon atoms in the benzene rings.

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Aug. 31st to Sept. 6th.—N.V.M.A. Congress at Ayr.

May 18th.—Entries due for D.V.S.M. Examination.
,, 23rd.—R.C.V.S. Annual Report and Voting Papers issued.
,, 27th.—Meeting of the Editorial Committee, N.V.M.A., 10 Gray's Inn Square, W.C., 4-30 p.m.
,, 30th.—R.C.V.S. Council Election—last day for receipt of Voting Papers.
June 6th.—R.C.V.S. Annual General Meeting.
,, 14th.—R.A.V.C. Annual Dinner.
,, 17th.—D.V.S.M. Examination commences in Edinburgh.
July 3rd.—R.C.V.S. Annual Dinner.
,, 4th.—R.C.V.S. Committee Meetings.
,, 5th.—R.C.V.S. Council Meeting.
,, 9th.—R.C.V.S. Written Examinations.
,, 11th.—R.C.V.S. Oral Examinations begin.

Eleventh International Veterinary Congress.

We are very pleased to be able to announce that the King has graciously consented to act as Patron of the International Veterinary Congress, to be held from August 4th to 9th, 1930. The programme of subjects to be discussed at the Congress will be settled by the Permanent Commission at a meeting in Paris on June 13th, after which date it will be possible to proceed more rapidly with preparations for the Congress.

N.V.M.A. Congress at Ayr.

Members attending the "National" Congress will be glad to learn that the Provisional Committee have introduced a new feature, which should be of great interest and value, in an exhibition of morbid specimens. It is proposed that this should take place on "Operations" day. The exhibits will be laid out with descriptive notes, and senders of specimens, who are attending the Congress, will be asked to make a few remarks regarding their specimens and to be prepared to answer questions regarding them.

University of London Animal Welfare Society.

The University of London Animal Welfare Society, which has been in existence for three years, has issued a manifesto to all members of the University pointing out that inhumanity towards animals still persists to such an extent "that it becomes impossible to rest satisfied with present standards in the treatment of animals." There are special reasons, it is stated, why members of the University should concern themselves with man's duty to animals, one of these being that the relevant facts should be brought before students, who in later life will influence public opinion directly as teachers, ministers of religion, journalists, or statesmen. Professor F. T. G. Hobday, principal of the Royal Veterinary College, is the President of the Society. The special problems which will be dealt with this year are trapping and the persecution of wild life.

R.C.V.S. Obituary.

Tranter, Thomas H., 30 High Street, Beckenham, Kent. Graduated Edinburgh, 19th December, 1898. Died 9th May, 1929, aged 53.

. . . . . .

The Late Mr. T. Smith, M.R.C.V.S.

Mr. T. Smith, M.R.C.V.S., whose death was reported in our last issue, went to Somerset from Edinburgh as a young man and resided at Williton until his death, which occurred unexpectedly at his residence on the 3rd inst. With a large circle of friends, it might be said of him that he never made an enemy. Possessed of a fund of Irish wit and humour which never failed, he was the best of company, and with his keen sympathy for others he endeared himself to those with whom he resided for so many years. An indication of his character is that for a quarter of a century he was associated with Mr. W. Brown, J.P., M.R.C.V.S., late of Wiveliscombe, and during that long period of close business ties and fellowship they never had one word at variance.

The funeral took place at very short notice on the 6th inst. amid every manifestation of respectful sympathy, many walking the mile and a half to the cemetery to be present at the service held in St. Decuman's Church.

The deep sympathy of their many West Country friends associated with the profession goes out to his widow and only daughter in their sad bereavement.

. . . . . .

Mr. Robert Norford.

Many practitioners will learn with sincere regret of the death of Mr. Robert Norford, who was well-known throughout the profession by reason of an association with Messrs. Arnold and Sons and John Bell and Croyden extending to nearly thirty years. To many generations of students at the Royal Veterinary College he was a familiar and welcome figure, as for many years he made a practice of attending at the College, where his advice and help in all that pertained to veterinary instruments were of much service to the students. Mr. Norford, who was 53 years of age, leaves a widow and one son.

CORRESPONDENCE.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Women and the Profession.

To the Editor of the Veterinary Record.

Sir,—Miss Shedlock has entirely misunderstood the meaning of the Council's resolution.

It is because the Council does not discriminate between men and women practitioners that it deprecates the making of exaggerated promises to women which, as Miss Shedlock herself agrees, could not be realised in the case of men. With the purport of the Council's resolution Miss Shedlock is clearly in sympathy—women should be allowed to enter the profession as freely as men, but should not be inveigled into it with specious promises of fame and fortune.—Yours faithfully, T. J. Bosworth.

University of Cambridge,
Department of Animal Pathology,
May 13th, 1929.

Milk and Public Health.

To the Editor of the Veterinary Record.

Sir,—I wish to make comment on a statement alleged to have been made by Professor Frederick Hobday, as re-

ported in *The Sunday Dispatch* of 5th May, 1929. Professor Hobday is reported to have said, " In some cities samples of milk are continually being taken which contain poison germs in proportions even as high as from 60 to 70 per cent." It is not stated what variety of poison germs are being found in the milk, but in view of the fact that the article under review opens with the statement that, " Over 10,000 children die every year from tuberculosis caught from the milk of the 1,000,000 infected cows in this country," one is led to understand that in some cities from 60 to 70 per cent. of milk samples are positive to an examination for tubercle bacilli ; I submit that such a statement is a gross exaggeration and, being made as it is in the public press, is most likely to mislead and confuse the public.

The newspaper article in question is given considerable prominence and carries the ominous headline, " Poisoned Milk Peril." While the statement that " over 10,000 children die every year from tuberculosis, caught from the milk of the 1,000,000 infected cows in this country," is not attributed *verbatim* to Professor Hobday, made, as it is, in close association with his name, one naturally assumes that these are his views.

One realises, of course, that certain sections of the modern press take great delight in such sensational reports, but one very much regrets that any member of the profession should allow his name to be associated with such inaccuracies. In these days of intensive milk propaganda I am afraid members of the public hardly know what to think of it all, and to the unknowing such statements only serve to make confusion worse.

The facts are that the mortality rate from tuberculosis in humans has been gradually declining during the past ten years and that the standard of clean milk production is gradually improving ; such statements in the press on the " Poisoned Milk Peril," fail to observe such points as that made by Dr. Stanley Griffiths in 1922, that pulmonary tuberculosis in humans is never caused by tubercle bacilli of bovine origin. No sane person would attempt to deny that tuberculous arthritis and ostitis are formidable, that the other tuberculous affections of children are serious, and that our most strenuous efforts must be continually directed to freeing the milk supplies of this country from tuberculous infection, but we should do so without unduly alarming the public, who are being bombarded, and rightly so, with the slogan, " Drink more milk." In our campaign to a purer milk supply we must endeavour to take the milk producer with us, and one knows from experience that such statements merely serve to arouse his antagonism, and perhaps naturally so, since it is always the blackest side of the picture that is shown.

As the public are now in possession of the results of the admirable work carried out by the Scottish Board of Health and Dr. Corry Mann on the experiments of feeding school children with an extra milk ration, and the good results have been so striking, the inaccurate statements attributed to Professor Hobday must leave them in a quandary.—Yours faithfully, S. SHARP.

The Poplars, Boston, Spa, Yorks.
6th May, 1929.

Proprietary Medicines.

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—In connection with the employment of proprietary medicines by some practitioners I directed attention in your issue of April 27th to the precedent you have created by permitting your columns to be used by practitioners for testifying to the virtues of ' Odylen.'

You, Sir, have refrained from justifying this precedent, but in your correspondence columns of May 11th, Messrs. Bayer Products Ltd., the vendors of ' Odylen,' attempt to do so by stating for my benefit that ' Odylen ' consists of dimethyl-diphenylene-sulphide 80 per cent., combined with 20 per cent. of ketones of high molecular weight, that I have made a most unfortunate slip and that I ought not to be surprised that " the official organ of the veterinary profession has devoted space on occasion to clinical reports on ' Odylen,' particularly as this skin dressing has proved to be a most effective remedy for follicular mange."

The advertisement *re* follicular mange may be left to those competent to give judgment on the available evidence. My " unfortunate slip " is excusable, for to the best of my knowledge the name of the chief constituent, " dimethyl-diphenylene-sulphide," has been mentioned neither in the clinical reports in question nor in any other column of the *Veterinary Record* until this very day. I have now before me a number of pamphlets (supplied by veterinary friends) and some advertisements in the *Record* concerning ' Odylen,' but I cannot discover the name of the component in question in any of these or on the containers of the preparation. In some of these it is called " Mitigal," a name utterly devoid of meaning to a student of chemistry.

I contend that the justification by Bayer Products Ltd., of the publications in the *Veterinary Record* completely fails unless you, Sir, were at the time of publication acquainted with the information now " repeated " by the company and unless the company had divulged the name in their advertisements addressed to members of the profession.

Some time ago I made some experiments with ' Odylen ' and I herewith submit some of the results of these to you for publication. It is satisfactory that your readers are now aware of the composition of 80 per cent. of the mixture, but the statement that the remainder consists of " ketones of high molecular weight " is very vague.

In my letter ' Odylen ' was merely taken as an example to illustrate a principle of interest to practitioners. I raised the question in June, 1928, in a paper before the Lincolnshire Division. The views of Sir William Willcox on the subject are deserving of the careful consideration of practitioners. In his Harveian Lecture he said : " At the present time there is a great tendency to use recently-introduced drugs, many of which are of foreign manufacture and are of synthetic organic nature. These drugs are advertised extensively and their virtues greatly extolled. I should like to advocate a plea for the use of old and well-tried remedies of which the therapeutic action is thoroughly understood and of which the value has been demonstrated by long experience " (*The Post-Graduate Medical Journal*, July, 1928).—Yours truly, G. W. CLOUGH.

Royal Veterinary College, London.
May 11th, 1929.

" The Long-lying Post-parturient Cow."

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—I am sure that all members of the profession should be eternally grateful to Mr. John Barlow for divulging his uuique treatment of the above. Those of us who, in those immediate post-war years, knew Mr. Barlow as the founder and first whip of the R.V.C. Ratting Club, always felt that one day some such scientific discovery as this semi-Sealyham therapy would come from him ; and I should like to be one of the first to offer my congratulations.

I have often used a dog to rouse a cow that slacks and refuses to rise immediately after calving, but in true post-partum paralysis this method avails us little. I find that stimulation of the spine in the lumbar region, complete evacuation of the intestines, a highly concentrated diet, and patience, give the most consistent results. I have had several rapid cures (in cases definitely not milk fever) following inflation of the udder with oxygen and the hypodermic injection of camphor.—Yours faithfully,

J. V. S. RUTTER, M.R.C.V.S.

Gwynne House, Hereford.
May 13th, 1929.

The Editor acknowledges the receipt of the following :—

Report of a meeting of the West of Scotland Division, N.V.M.A., from Dr. A. W. Whitehouse, Hon. Secretary.

Communications from Lt.-Col. J. W. Rainey (London) and Mr. J. F. L. Taylor (Punjab).